



CRITICAL SELECTION CRITERIA OF LINER SHIPPING OPERATORS: THE PERSPECTIVE OF GHANAIAN FREIGHT FORWARDERS

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DECLARATION OF ORIGINALITY

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ABSTRACT

Despite a great deal of research already conducted on the competitiveness of liner operators, existing studies have mainly focused on liner operator competitiveness from the perspective of shippers, and only limited research has been conducted from the perspective of freight forwarders. Freight forwarders not only represent 85% of shippers in dealing directly with liner operators, they also have valuable insights into the commercial operations of shipping lines. In this study, the views and perspectives of freight forwarders have been analysed so as to investigate the competitiveness of ocean container carriers.

A mixed model method was applied to analyse data collected from 103 valid responses of Ghanaian freight forwarders, and the results from exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) reveal six factors which influenced freight forwarder decisions in selecting liner operators. Schedule reliability was found to be the most influential factor, followed by documentation accuracy, service quality, freight rate, quick handling and environment concerns. The results of qualitative data analysis, based on the open-ended survey questions, also show that Ghanaian freight forwarder perceptions of customer service were also a significant factor contributing to liner operator competitiveness. Based on the study results, implications for liner shipping companies have also been drawn. For example, to improve their competitiveness, liner shipping companies need to focus on factors influential to their customers, especially freight forwarders' decision to select liner operators as identified by the study. Their marketing strategies need to cover important emerging issues such as environmental awareness, sustainable development and corporate social responsibilities in addition to traditional, well known marketing elements such as service quality and customer satisfaction.

This study has contributed in a number of ways to the literature on liner shipping competitiveness. First, it applied both exploratory factor analysis and confirmatory factor analysis to evaluate the effect of various factors on

shipping lines' competitiveness that have not been previously considered by similar studies. Second, the study has found that the views and perceptions of freight forwarders towards liner operators can offer valuable insights into the competitiveness of shipping lines. Third, it is the first study conducted on Ghanaian shipping and its freight forwarding sector. Therefore, the results can be a good reference for countries with similar social and economic conditions. The methodology developed by the study can also be replicated to other countries and sectors (air, land, rail and inland waters) to evaluate the competitiveness of their transport service providers.

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PUBLISHED PAPERS

In this thesis by monograph, the following papers were published in peer reviewed conferences and international journals:

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GLOSSARY

AGFI	Adjusted Goodness-of-Fit Index
AMC	Australian Maritime College
AHP	Analytic Hierarchy Process
ASV	Average Shared Variance
AVE	Average Variance Extracted
CEO	Chief Executive Officer
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CMA CGM	Compagnie Générale Maritime Compagnie Générale Maritime
CMIN/DF	Minimum Discrepancy/Degrees of Freedom
CR	Composite Reliability
DDP	Delivered Duty Paid
EFA	Exploratory Factor Analysis
ETA	Estimated Time of Arrival
FCL	Full Container Load
GCNET	Ghana Community Network
GDP	Gross Domestic Product
GHGs	Greenhouse Gases
GIF	Goodness-of-Fit Index
GIFF	Ghana Institute of Freight Forwarders
HREC	Human Research Ethics Committee
IFI	Incremental Fit Index
INCOTERMS	International Commercial Terms
LCL	Less than Container Load
LID	Legislative Instrument Decree

MICMAC	Multiplication Appliqnce a un Classement or cross impact matrix-multiplication applied to classification
MLM	Maritime and Logistics Management
MSC	Mediterranean Shipping Company
MSV	Maximum Shared Variance
NVOCC	Non-Vessel Operating Common Carriers
PCA	Principal Components Analysis
PCFI	Parsimony-adjusted Comparative Fit Index
PIL	Pacific International Lines
PRQ	Primary Research Question
RH	Research Hypothesis
RMR	Root Mean Square Residual
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modelling
SMC	Squared Multiple Correlations
SPSS	Statistical Package for the Social Sciences
SS HREC	Social Sciences Human Research Ethics Committee
TLI	Tucker-Lewis Index
UNCTAD	United Nations Conference on Trade and Development
UTAS	University of Tasmania

CHAPTER ONE

INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 RESEARCH BACKGROUND

It is well known that liner shipping companies rely on fixed regular services, unlike tramp shipping, which is chartered on a voyage by voyage basis (Notteboom & Merckx 2006; Samitas & Kenourgios 2007). The sector is dominated by container trade (Matilionis et al. 2013), and as a result, it is highly vulnerable to demand volatility. Due to this, liner companies tend to operate with substantial and chronic levels of excess capacity (Fusillo 2004; Kou & Luo 2016).

Changes in the global economy and trade over the last decade have had pervasive impacts on demand for ocean liner services, as well as on competition between liner operators. First, the global financial crisis erupted in 2008 and its effect still remains on the buying power of consumers. The world Gross Domestic Product (GDP) seemed to have recovered slowly in 2013, but it plunged back into recession again, causing many economies to struggle (United Nations Conference on Trade and Development 2015). Thus, liner companies are competing for the limited volume of cargo available.

Secondly, despite the recovery of the global economy and continuous growth of international trade, overinvestment and the continuous increase in vessel size approaching 20,000 TEUs has also led to a mismatch between supply and demand in the liner sector (Drewry Consultancy 2016). This has created pressure on shipping lines to improve their competitiveness in order to survive competition in the liner market. The competitiveness of liner shipping companies in such an increasingly complex market depends on a number of critical factors that influence client decision making when choosing ocean container carriers (Fanam, Nguyen & Cahoon 2016; Setamanit & Pipatwattana 2015). The survival of liner companies depends on their ability to attract shippers represented by freight forwarders, whose role is to coordinate container movement from the origin to the destination. Liner shipping companies focus on developing strategies to attract customers,

since customer satisfaction in the liner shipping sector is the cornerstone for market share increment by the ocean container carriers (Yuen, Thai & Dahlgaard-Park 2015).

Nearly 85% of all international shipments involve the services of freight forwarders (Kilibarda et al. 2016). Most businesses use freight forwarder services to move their products across borders, and approximately 85% of foreign trade is handled by freight forwarders (Djankov, Freund & Pham 2010; Eun & Seo 2013). Thus, it is of natural interest for them to consider the role of freight forwarders in liner shipping, especially from the perspective of the competitiveness of liner operators. Previous studies such as Gupta (2008), Meixell and Norbis (2012), Maheshika and Abeysekara (2015), Van den Berg, Roy and De Langen (2015) and Wen and Lin (2015) have acknowledged freight forwarders as being the key agent acting on behalf of shippers and dealing with liner operators.

The two primary classifications of legal roles for freight forwarders are that of agent (for the cargo owner) and the principal (Cain 2014 p25). The original duty of a freight forwarder is as an agent of the cargo owner, and therefore they represent and execute the business wishes of that owner. However, in most cases cargo owners tend to delegate the majority of that responsibility onto freight forwarders, who can make all critical decisions regarding the total execution of the carriage. Thus, increasingly it is freight forwarders who are playing the key role in choosing carriers, and thereby they are becoming the ones who determine the competitiveness of liner carriers for most routes and destinations.

The freight forwarders influence in choosing carrier depends on the type of agency engagement involved, that is, the extent of delegated authority. For example, a freight forwarder who is playing the role of a clearing agent only engages in the movement of cargo from the designation port to the premises of the cargo owner, and therefore does not engage in the selection of carriers. However, a freight forwarder who plays a role as a consolidator and non-vessel operating common carrier (NVOCC) is responsible for the

arrangement and coordination of the entire carriage, from factory to warehouse. Therefore, these freight forwarders exert a great deal of influence on the choice of carriers. The focus of this thesis is to investigate this latter role of freight forwarders, where they themselves are solely making the selection of ocean container carrier without a great deal of influence from cargo owners, because this role is becoming increasingly prevalent in the context of the Ghanaian freight forwarding sector.

1.2 PROBLEM STATEMENT AND MOTIVATIONS

The existing literature on liner shipping competitiveness has centred mainly on the analysis of carrier selection criteria from the shipper's perspective. For example, Bardi, Bagchi and Raghunathan (1989) studied carrier service factors observed by United States shippers prior to and during deregulation. Brooks (1990) analysed the service performance of ocean container carriers by evaluating the amount of importance that the Canadian shipper attached to selection factors when purchasing the shipping service from ocean container carriers. Abshire and Premeaux (1991) examined the perceptual differences between American shippers and carriers concerning the importance attached to carrier selection variables by the shippers. Tuna and Silan (2002) analysed carrier selection factors perceived by Turkish shippers in the liner shipping service. Lu (2007) evaluated important factors influencing the service performance of ocean container carriers from a Taiwanese shipper's perspective. Kannan, Bose and Kannan (2012) empirically investigated salient factors that India shippers observed when choosing ocean container carriers, based on the carrier's service quality. Ben-Akiva, Bolduc and Park (2013) explored carrier selection criteria that United States shippers perceived as important when buying transport services from liner shipping companies. Lirn and Wong (2013) evaluated the level of importance that Taiwanese shippers attached to ocean carrier service criteria.

However, little attention has been given to the selection of carriers from the freight forwarders' perspective (Wen & Lin 2015; Yuen, Thai & Dahlgaard-Park 2015). Freight forwarders were consider agent for the shippers,

therefore, theoretically it was assumed shippers nominate a carrier and freight forwarders comply with a carrier nominated by shippers. Practically, it is the freight forwarders who choose carrier on behalf of shippers and managed their logistics process (Reid & Burlingame 2015). Undertaking research related to the selection of ocean container carriers from the perspective of freight forwarder is valuable for enriching liner shipping company capabilities and competitiveness in the maritime industry. As shown in Chao and Chen (2014), Chu (2014) and Setamanit and Pipatwattana (2015), factors influential to freight forwarder decisions for selecting ocean carriers reflect the competitiveness of liner shipping companies. Competition in the liner shipping sector by global players in cargo volume attraction creates a need for shipping companies to position themselves strategically so as to attract customers to their services. Shippers and freight forwarders both supply cargo volume to ocean container carriers (Van den Berg, Roy & De Langen 2015), of which the latter offered more cargo volume than the former.

There is no consensus in the literature on the factors affecting the selection of ocean container carriers. Following the above studies and liner sector operational performance and profit maximisation, current studies take the view that freight forwarders predominantly engage in ocean carrier selection, and therefore their views and experience in dealing with liner companies should reflect the competitiveness of the ocean carriers because they have substantial knowledge and are deeply involved in liner shipping operations (Li, Zichao, Bookbinder & Elhedhli 2012; Saeed 2013). The perspective of freight forwarders on the selection of carrier is different to that of cargo owners, because the freight forwarders are agents who have different interests than that of cargo owners (Murphy, Daley & Dalenberg 1991; Murphy & Daley 2001). Thus, it is important to investigate salient factors that are considered by freight forwarders as they make their decisions to choose ocean container carriers.

Shipping has played a critical role in Ghana's trade and economic development, especially because the country is more dependent on exporting and importing compared to most West African nations. Its exports

of goods and services contribute to nearly half of its Gross Domestic Product (GDP), and its imports are valued at 10% of GDP with an annual percentage of 2.27 (World Bank 2014). Given the country's reliance on international trade, its maritime transport sector has increasingly played an important role in its economic development. In this way, the maritime sector contributes a significant share to Ghana's GDP.

The liner shipping sector in Ghana has continued to expand rapidly for the past number of years due to a shift from labour-intensive agriculture to capital-intensive manufacturing, which has caused containerised trade volume to grow by 64%, from 305,858 TEUs in 2003, to 841,989 TUEs in 2013 (Ghana Ports and Harbour Authority 2014). Even during the current economic downturn, container volume has continued to grow throughout Ghana, especially due to the post-election crisis in the Ivory Coast. That crisis placed Ghana in the position of being able to better attract container volumes from neighbouring landlocked countries (Burkina Faso, Mali and Niger).

It has also been important to use liner shipping transport to support the continued growth of the Ghanaian economy to meet cargo owner requirements. Therefore, the freight forwarders role has become much more important in achieving this objective. Approximately 95% of Ghana's foreign trade is carried by sea (Laursen 2014). This necessitates the use of freight forwarders, as most cargo owners are engaging them to do that.

Freight forwarders play a key role in facilitating Ghanaian exports and imports. There are 301 freight forwarders registered with the Ghana Institute of Freight Forwarders (GIFF). The freight forwarding sector in Ghana comprises of smaller local and bigger local/foreign multinational companies like DHL global, Bollore, Panalpina, Comexas, Damco, Antrak, Baj Freight, Conship, MacDan Shipping, Allship limited, Mass logistics and Freight Masters. There are also quite a number of medium size local freight forwarding companies. Increasingly, more freight forwarding companies in Ghana are operating as consolidators and NVOCCs engaging in entire transport management for their clients.

Ghana customs excise and preventive service plays a regulatory role under the Legislative Instrument Decree (LID 178) by licencing freight forwarders in Ghana to transact the business of freight forwarding on behalf of their clients (Ghana Customs Excise and Preventive Service 1993). This process aims to effectively regulate and control the operations of freight forwarding in Ghana.

1.3 RESEARCH OBJECTIVES AND RESEARCH QUESTIONS

The objective of this study is to examine influential factors considered by freight forwarders when selecting liner operators, and to provide an analysis of the ocean carrier selection criteria which affect the competitiveness of liner shipping companies. Based on this, implications of selection criteria for ocean container carriers will be provided, so as to develop their marketing and competition strategies. Şakar (2012) argued that as compared to freight forwarders, who are acting as agents on behalf of many industries for a wider range of traffic, shippers (exporters/importers) are not likely to have enough experience for the selection of ocean carriers.

In order to achieve the above research objective, the following research questions (RQ) will be answered:

RQ1: What are the key considerations for freight forwarders in their selection of liner carriers?

Over the last four decades, the discussion regarding factors influencing selection of carriers was centred on freight rates/cost and the reliability of pickup/delivery related issues (Abshire & Premeaux 1991; Cook 1967; Larson & Gammelgaard 2001; McGinnis 1990; Saldanha et al. 2009). However, Setamanit and Pipatwattana (2015) noted that the dimensions of influential factors observed when selecting ocean carriers have changed over time due to the dynamism fostered by globalisation. Thus, the selection of carriers by the freight forwarders affects the competitiveness of ocean container carriers, which leads to the next research question to be addressed.

RQ2: In what ways do freight forwarders' carrier selection considerations and practices impact the competitiveness of liner carriers on a particular route?

The selection of ocean container carriers by freight forwarders has a wide range of implications for liner shipping companies. Freight forwarder's selections of carriers may affect shipping line market share with regards to the amount of cargo volume a carrier can attract and carry per voyage, which reflects the total revenue a carrier generates. The selection of the "best" carrier by the freight forwarders can help shippers to reduce overall logistics costs and improve the delivery of shipper consignments to their intended destination in real time. The ability of ocean carriers to understand all selection criteria employed by the freight forwarders could enable them to respond to those specific criteria in order to attract freight forwarders. Attracting freight forwarders to a particular carrier like this can positively impact its competitiveness. Thus, the selection of suitable carriers by freight forwarders' enhances shippers' service satisfaction, and thereby directly causes more shippers to contract freight forwarders for cargo transportation. However, the selection of suitable carriers poses challenges to the freight forwarders, which leads to the next research question to be considered.

RQ3: What are the issues facing freight forwarders in the selection of liner operators?

Trade facilitation by freight forwarders poses a challenge through the efficient coordination of the logistics chain process among transport players, and the contract of carriage. As business progress issues always emerge, and freight forwarders are also confronted with these kinds of business challenges. Issues emanating in the freight forwarding sector can be detrimental to the existence of freight forwarders as a transport intermediary whose purpose is to coordinate the movement of goods efficiently and effectively without distorting the logistics chain.

Freight forwarders face both internal and external issues in their service delivery. Issues such as on-time delivery, reliable transit time, schedule

reliability, damage-free handling of cargo and favourable freight rates are the most cited issues discussed in the literature (Ding, Tseng & Hsu 2013; Maheshika & Abeysekara 2015). This is further discussed in the subsequent chapter.

Freight forwarders are mainly non-asset based; hence, they do not own the actual carriers for the carriage of goods. They also largely depend on the liner shipping companies for the main transport of goods by sea. As a result, freight forwarders have to make the right decision in selecting the 'best' ocean carrier for the transportation of goods. In choosing the most suitable ocean container carrier, a freight forwarder considers various factors before deciding on an ocean carrier to use.

Data gathered through an online survey will help identify influential factors affecting the selection of ocean container carriers. Data analysis will be conducted to test the relationship between these factors. The results obtained from the analysis will throw more light on how the factors influence the competitiveness of ocean container carriers, and the results will further show the weight of importance that freight forwarders attach to each influential factor.

This study used a structured questionnaire to survey views on the selection of ocean carriers from the freight forwarders' perspective in the Ghanaian maritime sector. This collection of data of these is necessary for answering the research questions. The study employed a web-based survey as the data collection technique to explore the influential factors guiding freight forwarder decisions.

1.4 RESEARCH METHODS AND ANALYSIS

There has been a significant shift in the last ten years in the selection of carriers, with authors such as, Saldanha et al. (2009), Park, JJ and Koo (2010), Sardana et al. (2010) and Van den Berg, Roy and De Langen (2014a) concentrating on the analysis of cost as a key driving factor influencing the choice of carriers as shippers aim to reduce transportation costs for international consignment delivery. The present study explores the

selection of ocean container carriers from the perspectives of freight forwarders, because the selection of carriers by freight forwarders significantly affects the market share and overall profitability of liner shipping companies. Theoretically, it is the shippers who are considered the decision makers regarding carrier selection. However, in reality, it is the freight forwarders who choose carriers on behalf of shippers (Amaruchkul & Lorchirachoonkul 2011; Flitsch & Jahn 2014).

In this study, the parameters that affect the selection of ocean carriers and which is found in the previous literature is examined and selected to constitute the main structure of the survey instrument. Discussions were held with freight forwarders and academics to check the appropriateness of the parameters selected from journal papers, and questions were amended based on discussions held with the academics and freight forwarders.

In order to effectively conduct the proposed investigation and test the weight of importance that the freight forwarders attached to each selection factor, a mixed model approach that is quantitative and qualitative (open-ended questions) has been used, as discussed in Chapter 4 and Chapter 5. For a quantitative approach, a valid responses 105 was collected from freight forwarders (with a response rate of 54.4%) in the developing country, Ghana. After elimination of cases with unengaged responses, 103 cases were used in the final analysis. Initially, measurement models in confirmatory factor analysis were tested using AMOS 22 software (Byrne 2013 & Gaskin 2013). The model was refined from the first-order model to second-order model. However, no measurement item was excluded from the 16 items identified during the exploratory factor analysis. The 16 items with six construct measures were used to test the second-order model. The proposed second-order model was found to have a better fit than the first-order model, and the results of the second-order model are then discussed in Chapter 6.

Furthermore, for qualitative analysis of the competitiveness of liner operators, five open-ended questions were asked. Content analysis was used to analyse the responses by categorising cases according to themes, enabling comparison and discussion and interpretation of the phenomena (Davies, MB

& Hughes 2014; Mason 2002). The open-ended questions findings showed further new directions on freight forwarder perceptions concerning the competitiveness of liner operators. However, the open-ended questions findings reinforced and supported the results of the quantitative analysis.

1.5 CONTRIBUTIONS AND SIGNIFICANCE OF THE STUDY

The present study contributes to the body of knowledge in the field of maritime transport in a number of ways. The major areas of contribution are:

- From a theoretical perspective, the study examines basic economic theory (the transport service buyer behaviour model) to gain a better understanding of freight forwarder buying decisions, and thereby contributes to an understanding of factors involved in freight forwarder buying decisions. Clearly, the applicability of the theory and implications for liner shipping, in regards to factors influencing the selection criteria is demonstrated.
- The study contributes to the literature by integrating data from a developing country into the empirical generalisations, where managerial implications are identified, and also significant contributions are made specifically to the context of Ghana.
- This study is the first of its kind to investigate carrier selection from the perspective of freight forwarders in the context of Africa, and it provides a platform for other empirical investigations to be carried out in future research.
- The conceptual framework proposed in the present study is validated with high explanatory power, and it achieves a good fit to the data. Therefore, the study contributes to the literature by validating the factors in the model. At the same time, the qualitative information provides support to schedule reliability, document accuracy, service quality, as well as freight rate within a carrier's competitiveness.
- While this study has chosen carrier selection variables from the extant literature, the appropriate methodological process has been followed for testing their reliability and validity (Campbell, DT & Fiske 1959; Gaskin 2013c; Hair et al. 2010).

- The study applied both first and second-order models through factor analysis to identify the influential factors affecting a choice of liner operators.
- Finally, this study is the first to test the hypothesis regarding significant factors impacting the competitiveness of liner operators from a freight forwarder's perspective, by applying both exploratory factor analysis and confirmatory factor analysis in the maritime sector.

In Chapter 7 (section 7.3) further details of these contributions are discussed.

The current study is expected to provide a better understanding of the competitiveness of liner shipping, especially from the perspective of freight forwarders, where previously only limited research has been carried out. The study identifies the influential factors in ocean carrier selection by freight forwarders, and provides an analysis of the relationships between these factors (Research Question 2). It also reveals the key issues facing freight forwarders, and based on this, draws implications for liner operators, freight forwarders, shippers and researchers. An understanding of the key factors employed by freight forwarders will enable liner shipping companies to improve their competitiveness and develop effective marketing strategies. Implications from the analysis will also help freight shippers to understand better the issues facing freight forwarders, and thereby help them to better manage their relationship with them.

1.6 STRUCTURE OF THE THESIS

The rest of this thesis is structured as follows. In Chapter 2, the extant literature is examined concerning factors that influence selection of liner operators from the freight forwarder perspective. Chapter 3 then presents the research framework and the freight forwarder buying decision model, and its implications for the competitiveness of liner shipping companies. Chapter 4 outlines the research methodology used in answering the research questions in order to achieve the research aims. This includes the explanations of the appropriate data collection method used. The unit of analysis, target population, sampling strategy, survey instruments and administration

processes, data collection and data analysis are explained in Chapter 4. Chapter 4 also discusses Ghanaian maritime trade, and more specifically liner trade and its contribution to the economy of Ghana. The role of freight forwarders in Ghana and their contribution to the economy development are all explained in Chapter 4. Chapter 5 conducts the analysis of the web-based survey data, and investigates the competitiveness of liner operators from the freight forwarder perspective in regards to factors influencing the selection of ocean carriers. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) are employed to discover significant factors that freight forwarders consider when selecting ocean carriers.

In Chapter 6, further discussion and interpretation of the results is presented around the salient factors employed by freight forwarders when choosing liner operators. The interpretation of results is vital to liner shipping companies because it will enable carriers to focus their resources on providing appropriate liner services in order to attract and retain freight forwarders to use their liner services. Finally, Chapter 7 concludes the summary of the research findings and offers a discussion of implications. It also presents contributions made by the research and explains the limitations and scope for future research.

In summary, this chapter has presented the background and overview of the research to be conducted. Background information has explicitly stipulated the research gap in the literature. The research problem, research question and objective of the study have clearly pointed out the importance of this study. Given the objective of this study, the following chapter will include a comprehensive review of the relevant theories which emerged from a thorough review of the literature, focusing on ocean carrier selection from the perspective of freight forwarders.

CHAPTER TWO

LITERATURE REVIEW

CARRIER CHOICE CRITERIA

CHAPTER 2 CARRIER CHOICE CRITERIA

2.1 INTRODUCTION

The phenomenon of globalisation has made it possible for shippers to compete in the international market, since it brings the need for delivery to the right place at the right time. Thus, the emphasis for shippers is to minimise transportation costs and transit time for consignment delivery. Consignments are hauled long distances from production centres to consumers, necessitating a need for the physical carriage of goods by carriers. As a result, over the past four decades the importance of carrier selection criteria has become much more of a research focus within academia and for industry experts. Earlier carrier selection studies focused mainly on the analysis of carrier choice from the shipper's perspective (Das 1974; Krapfel & Mentzer 1982; McGinnis 1979), with more attention given to cost as the determinate factor that influences choice of shippers. Shippers outsource their logistics service activities in order to lower transportation costs, to decrease consignment lead time, and to respond to international demand by the customers (Hong, Chin & Liu 2004; Rao & Young 1994; Wilding & Juriado 2004; Yang & Zhao 2016).

The outsourcing of logistics activities creates the need for freight forwarders to function as a transport intermediary with active participation in the international carriage of freight (Rajesh et al. 2011). The outsourcing of logistics activities to freight forwarders has enabled organisations or shippers to gain approximately 9% savings and 15% improvement in capacity and quality (Sahay & Mohan 2006). However, the freight forwarder has to deal with ocean carriers for the physical carriage of goods on behalf of the shipper, and has to select a particular carrier for the transportation of freight.

Carrier selection studies mainly concentrate on the examination of influential factors affecting the selection of carriers based on perceptual differences between shippers and carriers (Abshire & Premeaux 1991; Jerman, Anderson & Constantin 1978; Matear & Gray 1993). This perceptual difference remains evident in many previous studies with the fundamental

issue being a level of dissatisfaction with services provided by carriers to shippers (Gibson, Rutner & Keller 2002; Premeaux 2010). Evans and Southard (1974) is one of the earlier studies to analyse carrier selection factors by exploring perceptual differences between shippers and carriers. Their finding revealed that carriers do not have the views on the important selection factors as shippers.

More recent studies are focusing on the evaluation of factors affecting choice of carrier and mode from the perspective of freight forwarders. Most of these studies have observed factors such as after delivery service, transit time, safety quality, flexibility, and reliability as the main influential factors that affect the choice of carrier from the viewpoint of freight forwarders (see for example Chung, Chung & Tai 2011; Ding et al. 2016; Reis 2014).

This chapter focuses on providing a review of the literature about the issues and factors which affect the decisions of freight forwarders in selecting carriers. The review is based on a search of relevant studies using various search engines, including Google Scholar, Science Direct, Taylor & Francis Online Journals, Emerald Library, Elsevier, UTAS Library catalogue, MegaSearch, Conference papers, ProQuest, Web of science, published books, and PhD thesis, with the purpose of identifying state of art research and areas of interest for further investigation.

The search results indicate that the selection of ocean container carriers has not been widely discussed in the literature from the freight forwarder's perspective. There is a very limited number of studies on the factors that influence the choice of ocean container carriers from their perspective (see for example Chung, Chung & Tai 2011; Lin & Yeh 2010; Wen & Huang 2007).

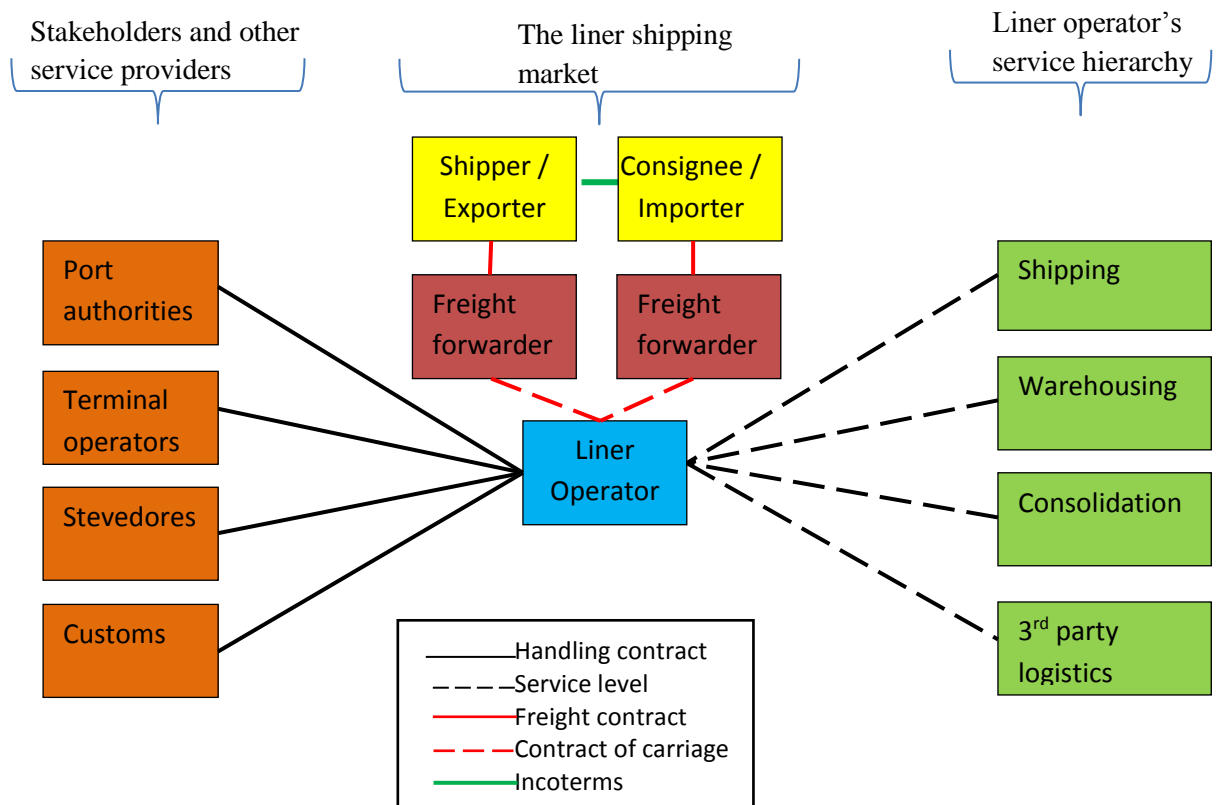
This chapter also provides an overview of the role of freight forwarders in contributing to the competitiveness of ocean container carriers. The next section discusses the relationships between parties in liner shipping as the basis on which the role of freight forwarders and their relationships with liner operators will be reviewed in subsequent sections.

2.2 RELATIONSHIPS BETWEEN PARTIES IN LINER SHIPPING

Figure 2.1 presents the relationships between parties in liner shipping. Figure 2.1 was developed base on the literature review and discussion with professional freight forwarders and logistics experts. The relationship between parties include:

- Stakeholders and other service providers – this shows that efficient cargo flow is enabled by other stakeholders within the container supply chain such as port authorities, terminal operators, stevedores and customs, and the effective coordination of liner operators with these network actors is vital for smooth container flow.
- The liner shipping market – is the core business area of liner operators in which they deal with their business-to-business customers such as freight forwarders, shippers, and the consignees for freight generation.

Figure 2.1: Relationships between Parties in Liner Shipping



Source: Author

- The liner operator's service hierarchy – this identifies the level of services provided by liner operators such as shipping services, warehousing, consolidation and third party logistics.

The above relationships are characterised by the following elements:

- The international commercial term (incoterm) contract exists between the shipper (seller) and the consignee (buyer)
- The shippers or consignees engage in the freight contract, with freight forwarders for the transportation of cargo from the origin of the shippers or (seller's warehouse) to their destination (buyer warehouse).
- The freight forwarders engage ocean carriers in a contract of carriage for physical transportation of cargo from port of origin to destination port.
- The ocean carrier undertakes the actual handling of cargo by liaising with other transport actors within the container supply chain by engaging in a handling contract with port authorities, terminal operators and stevedoring companies for the safe and fast handling of cargo through the maritime transport interface.
- Liner operators facilitate the cargo handling process by providing the services of shipping, warehousing, the consolidation of cargoes and haulage services to assist customers in reducing cost.

The effective collaboration of ocean carriers with terminal operators, port authorities, stevedore companies and customs can foster the free flow of cargo through the maritime interface, and significantly improve total transit time within the container transport chain (Fransoo & Lee 2013). Any delay or disruption in the container terminal will have a knock-on effect on the other areas of the container supply chain. For example, a delay in terminal operations will affect transit time, cost, and service reliability. Likewise, the ability of ocean container carriers to obtain a berth on arrival or to obtain a dedicated berth in the port could greatly improve the carrier's port turnaround time. Freight forwarders as transport intermediaries largely depend on an ocean carrier's effective coordination of cargo flow through terminals to

improve the container flow within the logistics chain (Van den Berg, Roy & De Langen 2014a).

Figure 2.1 indicates that the key selection criteria used in the selection of ocean container carriers begin with main international commercial terms (incoterms) contracts signed between shippers (sellers) and consignees (buyers). Either of the two parties then engages the freight forwarders to execute the cargo delivery (Grainger 2014). The shippers and freight forwarders engage in a contract of carriage in which the freight forwarders assume the obligation to deliver the cargo to the named destination appointed by the shippers. In most cases, the freight forwarders are obliged to deliver the cargo to the consignees based on the type of incoterm contract which has existed between shippers and consignees. For the freight forwarders to fulfil their obligation of logistics transport for door-to-door cargo delivery, freight forwarders contract liner shipping companies to undertake the physical carriage of goods (Van Der Horst & De Langen 2008). As a result, a carriage of freight contractual agreement exists between ocean container carriers and freight forwarders. Liner operators offer a hierarchy of services such as shipping, warehousing, consolidation and third party logistics in order to meet the demand of their customers.

2.3 THE ROLE OF FREIGHT FORWARDERS IN LINER SHIPPING

The rapid increase in world trade and the relocation of industries to low labour cost regions requires quick cargo documentation in logistics chains. The movement of goods across national frontiers requires customs clearance. Globally however, customs clearance involves “tedious checks, irritating delays and complicated form filling” (Appeals & de Swielande 1998 p.111). Goods need to be processed on-time through customs. Ironically, customs documentation processing has remained the most difficult challenge confronting shippers in maritime operations in many countries (Haughton & Desmeules 2001; Muthuvelatutham & Karuppasamy 2013). As a result, cause major delays in cross-border cargo clearance for cargo owners (Hoffman & Bhero 2015). The uncertainty associated with customs

regulations and procedures tends to be high, especially in developing countries (Sawhney & Sumukadas 2005). According to (Arvis et al. 2007) bureaucracy and inefficiency in customs documentation clearance are the biggest hindrances to international trade. Inadvertently, customs procedures and clearance times are still bottlenecks in the international logistics chain (Grainger 2014). More than 70% of the delays associated with cargo movement is due to administration hurdles, numerous customs procedures, tax procedures, and cargo inspections, often before containers reach a port or after leaving a port (Djankov, Freund & Pham 2010). The freight forwarder's management of the cargo documentation process enables shippers to sail through rigorous government regulations (Park Choi & Zhang 2009; Reid & Burlingame 2015).

International shippers are looking for single-source suppliers to deliver door-to-door services on time and at a reasonable cost (Lam & Zhang 2014; Murphy, Daley & Dalenberg 1992). Banomyong and Supatn (2011) found that only 19% of shippers like direct contact with shipping companies. Several factors contribute to the popularity of freight forwarding services. First, the just-in-time concept and the intensification of globalisation are some of the factors which necessitate shippers or manufacturers to rely on freight forwarders for pick-up and delivery of products across international boundaries from origin to their destination markets (Chuah & Yingling 2005; Goldberg 1990; Zimmer 2002).

Secondly, the ambiguity of international rules and regulations in logistics processes are some of the challenges confronting shippers. Since 11/9/2001 international transport has undergone constant and dramatic changes concerning transportation regulations and standards (Peterson & Treat 2008). Due to risk perceived to be associated with international transport of goods, especially containerised cargo, because containers pose a significant opportunity for terrorist to use as weapon of mass destruction across nations (Leonard, Gallo & Véronneau 2015). As a result of this, there has been frequent changes on regulations with regards to international transportation of goods. The frequent changes of rules and regulations governing the

international carriage of goods poses a challenge to shippers (Terpstra, Foley & Sarathy 2012). A typical example is a recent amendment by China, to introduce a 24-hour manifest rule without any notice to shippers prior to changes (Knowler 2014). In most cases, smaller shippers who are predominantly not versatile with transport procedures, especially transport procedures in foreign countries, tend to contract the services of freight forwarders to manage their cargo movement (Reid & Burlingame 2015; Schramm 2012; Tongzon 2009).

Furthermore, as Nordas, Pinali and Grosso (2006) note, shippers in developing countries face the difficulty of lengthy administrative procedures related to exports and imports, which prevent local shippers from exporting time-sensitive products. Shippers are confined to the domestic market because they cannot meet reliability requirements as demanded by foreign customers (Nordas, Pinali & Grosso 2006).

Cargo owners can overcome hinterland transportation challenges in foreign countries through the outsourcing of transportation activities to freight forwarders (Ducruet, César & Van Der Horst 2009). Cargo owners contract freight forwarders in international logistics operations as a strategic move to reduce investment in logistics activities, including capital investment in facilities, equipment, information technology, and manpower (Razzaque & Sheng 1998). Shippers outsource logistics activities because they want to access world-class processes, quality service, a better capability of adjusting to changing environmental needs, reducing the need for capital investments, better cash-flow, reliability, and customised and cost-effective logistics processes (Persson & Virum 2001). Shippers have obtained lower freight rates through freight forwarders than if the shippers themselves got freight rates directly from carriers (Lambert & Cooper 2000).

Kokkinis, Mihiotis and Pappis (2006) revealed that only 33% of cargo owners usually select the carrier, whereas freight forwarders do 67% of carrier selection on behalf of shippers. Lieb and Miller (2002) explained that over 60% of United States shippers confirmed engaging the services of freight forwarders for the movement of their shipments from origin to destination.

The study of Coppersmith (2003) pointed out that more than 60% of domestic and 90% of international cargo volume are tendered by freight forwarders. The selection of a carrier for inbound and outbound freight movement is important for the shippers (Meixell & Norbis 2008), whereas making a reasonable decision to select the 'best' carrier by shippers can be seen as a strategic tool for achieving competitive advantage (Bhatnagar & Teo 2009). Cargo owners outsource ocean carrier choice to freight forwarders, and only a few cargo owners select ocean carriers in-house (Gailus & Jahn 2013).

The single largest component of cost in international trade is logistics costs, often comprising of over half of the total international trade costs (Arvis et al. 2016). The cost of transportation can have a significant impact on a manufacturer's finished product, and even raw materials are driven by the cost of shipping (Monczka et al. 2008). The insightful knowledge and practical expertise possessed by freight forwarders in logistics management enables them to help shippers minimise logistics costs and delays in cargo processes (Schramm 2003).

2.3.1 FREIGHT FORWARDERS AS SHIPPING AGENTS

A freight forwarder is a person who primarily coordinates the transportation of goods on behalf of a consignor or consignee, and acts as a port representative for an exporter or importer, providing export and import related services (Ullman 1970). According to Hill (1972) it is not easy to establish an accurate definition of freight forwarders, owing to the difficulties of determining the exact scope of their activities which leads to various definitions about a freight forwarder. The author defines a freight forwarder as any person who hires his or her services out to the general public so as to provide and arrange transportation of property for compensation, and who may assemble and coordinate shipment for such purposes (Hill 1972). However, Murphy and Daley (2001) have described freight forwarders as international trade specialists who can provide a variety of functions to facilitate the movement of cross-border shipments on behalf of shippers.

Additionally, the European Commission (2011) has explained that freight forwarders organise transport and handle all documentary issues, such as

customs declarations, cargo documents or letters of credit. They strive to achieve the best possible transport services for customers through the arrangement of regrouping, storage, management, packaging and the distribution of cargoes. The services of freight forwarders further include auxiliary and advisory services regarding the issuing and managing of documents, customs facilitations, declaring cargoes to the authorities, the insurance of merchandise, and collecting and paying freight (Federation Internationale des Association de Transitaires et Assimiles 2011). However, the present study has define a freight forwarder as a person who make him/herself available for the public to perform part or whole of transport services of moving goods from origin to destination including documentation process, logistics operations, professional advice and even representing exporter (seller) or importer (buyer) in travelling arrangement.

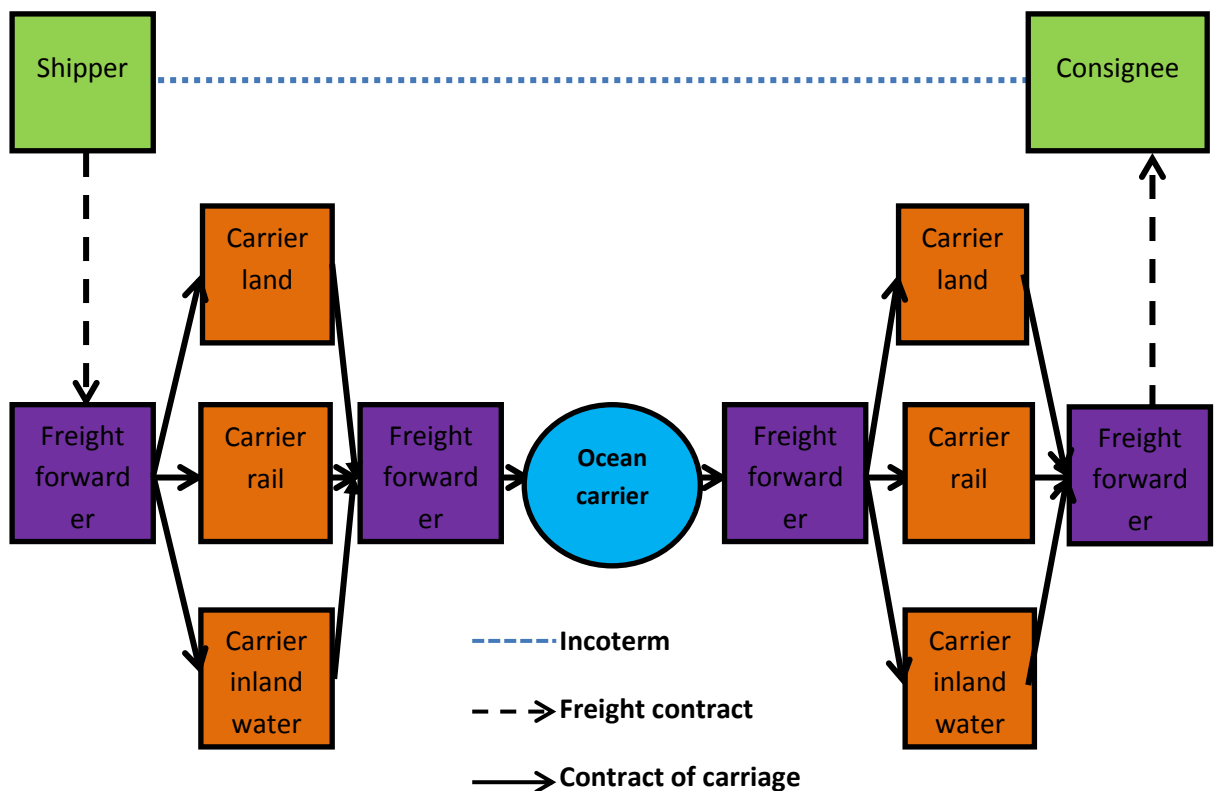
The introduction of the container and its fundamental part in the modern door-to-door delivery service has broadened the scope of services for freight forwarders (Cain 2014). In their new capacity, freight forwarders stand in the gap for cargo owners, to facilitate a smooth process for goods through the container logistics chain from sender to receiver. In most cases, freight forwarders generate profits from the difference between the price that customers are obliged to pay for the requested execution, and the costs of request fulfilment (Krajewska & Kopfer 2006a). In the international logistics chain, freight forwarders play a significant role in the various stages of the transport logistics process in facilitating the smooth movement of goods.

Figure 2.2 shows the role of freight forwarders within the international transport logistics chain. Freight forwarders who depend on their agency engagement as NVOCCs may act as a one-stop-shop shipping point for cargo owners (Murphy and Daley 1995). In this capacity a freight forwarder manages the entire transport chain for cargo owners from manufacturer's premises to the consignee's warehouse. The shippers and consignees deal with the freight forwarder, who manages the entire transport logistics chain on behalf of shippers and consignees. This section discusses who freight

forwarders are and their position in the transport logistics chain as shown in Figure 2.2.

As mentioned in the introduction chapter, the main focus of this study is to identify important factors which are taken into consideration by freight forwarders when selecting an ocean container carrier, and how these factors reflect the overall performance and competitiveness of liner shipping companies in terms of the percentage of market share control by liner operators. The subsequent section discusses the role of freight forwarders in international maritime trade.

Figure 2.2: Cargo Movement via a Typical Transport Logistics Chain



Source: Author

Traditionally, a freight forwarder engages its principal (the shipper) into contracts with the performing parties (carriers) for the carriage of freight from the loading port to the destination port (Cain 2014). By so doing, a freight forwarder serves as a bridge between a cargo owner and a carrier (Saeed 2012). During their earlier functions, a freight forwarder can only manage an import clearance of cargo and arrange for the local transport delivery of cargo

to the consignee's warehouse, or provide other export and import related services (Ullman 1970). However, the role of freight forwarders has evolved over time to a phase in which they are active coordinators working between the buyer and seller together, through provision of a wide range of value adding services associated with customs clearance, freight management, and even logistics operations (Shang & Lu 2012). They coordinate all parties involved in the contract of carriage by making sure that the rules and regulations governing the contract of carriage are fully observed by all parties. Most cargo owners, regardless of their size and capacity tend to employ the services of freight forwarders in logistics management, due to the high levels of knowledge that they possess in coordinating the international logistics chain.

2.3.2 FREIGHT FORWARDERS AS CARGO CONSOLIDATORS

International freight forwarders are extending their scope of work to cover a broad spectrum of services so they can improve the satisfaction levels of shippers (Dicken 2003). Ramberg (1998) explained that freight forwarders have established themselves in some cases as indirect carriers, such as for non-vessel operating common carriers (NVOCCs) on maritime carriage. The freight forwarders purchase transport services from various carriers and consolidate smaller shipments from numerous shippers into large shipments, moving them to a certain destination at a lower rate (Glass 2013; Lai & Cheng 2004). The pivotal role played by the freight forwarders in cargo consolidation, harmonisation and streamlining the distribution channel process of goods within the logistics chain is extensively discussed in the literature by researchers such as Pope and Thomchick (1985), Hesse and Rodrigue (2004) and Olsson and Woxenius (2012). Freight forwarders are modernising logistics activities by performing value adding services such as freight booking, pick-up, storage, insurance, import-export documentation (for example, customs clearance), consolidation of cargo at origin into standard containers, breaking bulk shipments at the destination, and providing local delivery to the consignee (Gupta 2008).

Some empirical research on large international manufacturers conducted in the United States by Lieb and Bentz (2005) showed that a very large proportion of American shippers utilise the services of freight forwarders in international cargo movement. Manufacturers are looking for global logistics packages rather than being limited to straight shipping, and affirmatively, freight forwarders are providing global logistics packages through the new value-added services of vertical integration along the supply chain (Notteboom & Merckx 2006). Freight forwarders provide more customised services and a wider scope of operations which suits customers' needs (Selviaridis & Spring 2007; Yeung et al. 2012). Due to the involvement of multimodal, cross-border transporting of goods, freight forwarders are assisting shippers to improve supply chain lead times, increase the reliability of goods movements, and significantly reduce the input or operation costs (Rodrigue 2012). There are spiral tasks of activities performed by freight forwarders which attract shippers to engage their services.

According to Horn (2010), freight forwarders handle approximately 90% of international air freight. Freight forwarders will continue to attract more cargo volume than carriers due to the capability of the former to consolidate less than container load (LCL) cargo from cargo owners (Cheung, Tong & Slack 2003; Lai, & Cheng 2004; Yang 2012a). During the period from 1997 to 2007, the LCL volume consolidated by freight forwarders increased by 12% (MergeGlobal Value Creation Initiative 2008). Cargo consolidation leads to a more efficient use of containers, and substantial costs and time are saved through the efficient usage of full container loads (FCL) which also help to optimise the use of cargo space on board carriers (Chow, Choy & Lee 2007; Heaver 2010; Imai, Nishimura & Current 2007; Saini & Vaishya 2016).

2.3.3 FREIGHT FORWARDERS AS DOOR-TO-DOOR TRANSPORT FACILITATORS

In the twenty-first century, ocean container carriers are facing keen competition and are under pressure to diversify their services into shore based activities as well as engaging in multimodal transport and logistics services. This is because most shippers are soliciting for more than sea transport (Grosso & Monteiro 2008). In this era of globalisation, shippers are

demanding new dimensions of service (door-to-door service) which are beyond the normal scope of services for most ocean container carriers. The core function of ocean container carriers is to provide maritime shipping. As a result, most ocean carriers only offer maritime transport. According to Semeijn and Vellenga (1995) shippers are seeking to find transportation companies that will accept shipment, choose the most efficient mode or modes of transport, provide other types of logistical services, for example, pickup and delivery, inventory management, proper documentation, as well as offer delivery of consignment in a safe and timely manner at a reasonable cost. International freight forwarders have the capability to respond to the new demands of shippers by providing door-to-door service (Saeed 2013; Van den Berg, Roy & De Langen 2014b). Freight forwarders are particularly customer-oriented, providing transport services and performing associated formalities which are compatible with the shipper's supply chain plan (Shang & Lu 2012).

Freight forwarders offer a substantial quantity of cargo volume to liner shipping companies due to their ability to coordinate and even provide door-to-door shipment through the consolidation of small amounts of goods into full container loads and co-loads (Chung, Chung & Tai 2011). Parola and Musso (2007) noted that the output growth of freight forwarders has been considerably faster in terms of container volume than that of shipping lines. They usually coordinate logistics activities for many manufacturers and shippers within supply chains, enabling them to tender a high cargo volume to ocean container carriers (Chow, Choy & Lee 2007). They are constantly finding new ways to perform logistics activities to improve service delivery to customers.

Currently, most freight forwarders are enhancing their services by providing tailor made services to increase customer service satisfaction, since they do not have heavy capital investment like owning ships, which makes them flexible in their service delivery to suit shipper demand (Miyashita 2015; Rudjanakanoknad, Suksirivoraboot & Sukdanont 2014). In many cases, smaller shippers find it difficult to cope with the numerous rules and

regulations administered in international maritime transport across jurisdictions. This thereby encourages them to contract freight forwarders to manage their logistics chain, which then enables the former to access foreign markets (Yang 2012a).

Freight forwarders are often referred to as merchant haulage (Flitsch & Jahn 2014; Van den Berg, Roy & De Langen 2014a; Wagener 2014), and are responsible for booking cargo space on-board, coordinating and integrating processes within the transport chain to provide door-to-door logistics shipping services (Wagener 2014; Yang 2012a). Freight forwarders as logistics service providers are now moving to a position where they can exert sufficient influence and become the de facto director of the door-to-door transportation chain (Fransoo & Lee 2013). However, a few shipping lines are expanding their role by offering global logistics services (Panayides et al. 2012). In Europe and North America, major liner shipping companies are now offering door-to-door service to provide shippers reliable fast service through a single supplier (Heaver 2010). Even though some large shippers deal directly with liner shipping companies, many others engage the services of freight forwarders to manage their logistics operations (Woolford & McKinnon 2011).

Shippers are showing a keen interest in the qualitative performance of the whole transport chain regarding reliability, availability, and compatibility (Notteboom & Rodrigue 2008). In order to provide a high quality logistics service to shippers, freight forwarders provide extra essential services such as warehousing, assembling and disassembling, insurance, packaging, labelling, information technology, and customs clearance, which the liner shipping companies are not able to provide to shippers directly (Durvasula, Lysonski & Mehta 2000). Shippers demand transparency in door-to-door services which shipping lines find difficult to provide (Haralambides & Acciaro 2010). The efficient and seamless integration of inland transport to maritime transport in the door-to-door movement process of goods helps reduce transport costs for shippers, of which inland costs alone count for 40-80% of total transportation costs (Panayides & Song 2013). Thus, shippers engage

the services of the freight forwarders for a door-to-door process within the supply chain. The contracting of the freight forwarder service by shippers enables the former to supply a high volume of cargo to the liner shipping companies.

The next section discusses the relationship between freight forwarders and liner shipping companies with regards to the volume of goods offered by freight forwarders to them.

2.4 THE RELATIONSHIP BETWEEN FREIGHT FORWARDERS AND LINER OPERATORS

The purpose of collaboration between organisations is to connect resources directly and exchange relevant information so as to create a common mutually agreed plan, and this is no exception in the collaboration between freight forwarders and ocean carriers (Krajewska & Kopfer 2006a). The collaboration between ocean carriers and other firms brings new opportunities for sharing resources and information, increasing economies of scale, utilising assets more efficiently and increasing sales (Yang et al. 2015). The cooperation between organisations enables them to reach goals that cannot be achieved when they act individually (Krajewska & Kopfer 2006b). In the highly competitive liner shipping sector, ocean carriers can maximise their level of efficiency through collaboration and networking (Wang & Kopfer 2014).

Freight forwarding companies and liner shipping companies work together to fulfil the transportation demands of their customers within the transportation chain, where the freight forwarders subcontract freight carriers for the physical movement of goods (Schönberger & Kopfer 2011). Schönberger and Kopfer (2011) further pointed out in their findings that cooperation between freight forwarders and carriers also increases the capacity for carriers. Under various market conditions the result is not only in favour of the carrier but is a win-win situation for both freight forwarders and liner shipping companies too (Li & Zhang 2015). As shown in Djankov, Freund and Pham (2010), freight forwarders handle approximately 85% of foreign trade. Thus, the collaboration of ocean container carriers with freight forwarders is imperative

in order for them to increase their cargo volume and remain competitive in the market.

The relationship between carriers and freight forwarders can provide an uninterrupted total logistics service for the attainment of competitive advantage to all parties involved in the contract of carriage (Ha, Park & Cho 2011). Liner shipping companies and freight forwarders must recognise this role as providers of total physical distribution and comprehensive logistics service providers within the international transport chain (Lu 2003a). The relationship between freight forwarders and shipping lines is essential for enhancing efficiency and effectiveness of cargo management through the supply chain (Bichou & Gray 2004).

2.4.1 DIFFERENT INTERESTS OF SHIPPERS AND CARRIERS

Under fierce market competition, liner shipping companies must find new ways to attract and retain their customers. Liner shipping companies are developing marketing strategies to enhance customer loyalty and satisfaction (Chao & Chen 2014; Hu & Jen 2010). The relationship between carriers and freight forwarders is increasingly important due to perceptual differences between carriers and shippers on important selection criteria influencing the choice of carrier. The differences in the perception of carriers and shippers is extensively discussed in the literature (see for example Gibson, Rutner & Keller 2002; Premeaux 2010; Zsidisin, Voss & Schlosser 2007).

Carrier misunderstandings concerning the important factors considered by shippers when choosing them has revealed an indirect relationship between carriers and shippers (Soroya & Ortiz 2012). In most cases, shippers make a selection of ocean carriers through their representative freight forwarders, who deal directly with the ocean container carriers and nominate a carrier on behalf of the shippers (Schramm 2012). The literature documents the level of perception differences between shipping companies and shippers which leads to the service gap of dissatisfaction to the customers of ocean carriers (see for example Durvasula, Lysonski & Mehta 2000; Lu 2000).

In the transport market, carriers do not have a clear understanding of the important factors influencing the decision making process behind shippers' choice of carrier (Foster & Strasser 1990). In order to compete effectively in the ever-changing liner shipping market, ocean container carriers must strive to provide the required shipping service to their customers (McMullen 2000). Liner shipping companies can only provide the required shipping service by understanding the actual decision making processes regarding the selection of liner operators.

The literature has shown several factors that affect the selection of carriers, with carriers misunderstanding important factors taken into consideration by shippers (Guo, Peeta & Mannering 2016; Lu 2003a, 2003b; Rajesh et al. 2011). Previous studies on carrier selection have found significant statistical differences between carriers and shippers, where carriers have rated critical selection factors considerably differently from those of shippers (Durvasula, Lysonski & Mehta 2000; Lu 2000; McGinnis 1979).

Abshire and Premeaux (1991) examined perceptual differences in carrier selection between shippers and carriers to find out if carriers understood the factors that shippers deem important when using transport services. They found statistically significant perceptual differences between shippers and carriers. Again, a longitudinal assessment by Premeaux (2002) on carrier selection criteria revealed a significant perceptual difference between carriers and shippers on important selection factors, with carriers rating factors totally differently from those of the shippers. Similarly, a study by Premeaux (2010) examining 36 carrier selection variables found that there were statistically significant differences in the perceptions between shippers and carriers. That is, carriers and shippers agreed on only nine variables out of the 36 selection (Premeaux 2010). Additionally, a re-examination of the perceived importance of carrier selection factors by Premeaux (2011), revealed a statistically significant perceptual difference between shippers and carriers.

In this way, perceptual differences between carriers and shippers on what factors are considered important for carrier selection by shippers has remained an issue in the literature. Carriers do not appear to have a full

understanding of the factors influencing shipper decisions (Grosso 2011). However, a similar study on perceptual differences between carriers and freight forwarders was conducted by Gligor and Holcomb (2014) and showed little perceptual difference between the two parties on important factors, indicating that freight forwarders and carriers related closely to each other. Carriers and freight forwarders relate closely because freight forwarders deal directly with carriers on day to day basis whereas freight forwarders tender more cargo to carriers on a daily basis, hence, carriers have better understanding of forwarders.

Due to perceptual differences between carriers and shippers, ocean carriers are unable to provide required services to shippers. Freight forwarders are the actual decision makers in the selection of ocean carriers. Brooks (1985) noted that almost half of exporters do not engage in a direct relationship with ocean carriers concerning the choice of carriers. Exporters transfer the selection of ocean carriers to their representative (freight forwarder), who then makes direct contact with ocean carriers. As a result, ocean container carriers largely depend on freight forwarders for the booking of cargo volume to load on board their vessels.

2.4.2 SHIPPING LINE COMPETITIVENESS: THE FREIGHT FORWARDER'S PERSPECTIVE

In general, shipping lines service operations require close work with freight forwarders who are employed to represent the shippers (Bowen & Leinbach 2004). Freight forwarders can help liner shipping companies to streamline the fluctuation of cargo volumes by purchasing freight space in advance from carriers (Panayides et al. 2012). In the current competitive liner shipping market, ocean container carriers are moving towards the practice of logistics hubs and spoke systems. As a result, exerting pressure on ocean container carriers to deal with freight forwarders in order to generate cargo volume (Nam & Song 2011).

International shippers are looking for carriers that can provide seamless global transport services with the ability to pre-clear customs, provide single bills of lading, and handle all documentation (Fawcett & Birou 1992; Fransoo

& Lee 2013). Freight forwarders provide logistics-related services through effective transport coordination that helps shippers overcome transport-related challenges in international cargo movement (Ireton 2007). Shippers use freight forwarders to enable the former to respond to the needs of manufacturers or consignees in the just in time system. Shippers in most cases contract freight forwarders to manage their logistics operations in order to allow them to focus on their core business, thereby improving customer service (Crum & Allen 1997; Lieb & Miller 2002; Qureshi, Kumar & Kumar 2007). Modern freight forwarders assist shippers to respond to their market need on-time (Krajewska 2008). In the logistics process, freight forwarders add value to shippers by performing services that are otherwise not available, and help lower transport costs by passing on a portion of the discount they receive from the carriers to the shippers (Gupta 2008).

Liner shipping companies sign contracts of allotment with freight forwarders in order to secure stable volume for a reasonable period, and to benefit from maximum utilisation of capacity (Levin, Nediak & Topaloglu 2012). The cooperation between freight forwarders and liner shipping companies is a strategic means for bringing service satisfaction to shippers. Liner operators recognise the importance of freight forwarders in coordinating and organising cargo information flow within international logistics chains. Freight forwarders are the information hubs, due to their superior knowledge in international logistic processes, and their social network with cross-border contacts to colleagues in foreign countries (Schramm 2003).

Amaruchkul, Cooper and Gupta (2011) studied contractual relationships between carriers and freight forwarders and showed that freight forwarders typically offer more services than carriers, and that freight forwarders offer lower prices to shippers in terms of standard tariffs provided by carriers. Freight forwarders offer a lower freight rate because they receive a volume discount from carriers. Carriers pre-allocate a large proportion of available capacity on board their carriers to freight forwarders (DeLain & O'Meara 2004). For carriers to remain competitive in securing reasonable cargo

volume, they allocate cargo capacity to freight forwarders prior to the start of each season (Amaruchkul & Lorchirachoonkul 2011).

Carriers' ability to maintain their competitiveness depends on the establishment of close relationship with freight forwarders (Burkovskis 2008; Lillie & Sparks 1993), because freight forwarders have marketing expertise and long-term relationships with shippers, which enable them to attract demand that is not directly accessible to carriers (Gupta 2008). For example, freight forwarders act as wholesalers and provide value-adding services such as packaging, assembling, warehousing, which carriers are usually not equipped to perform on their own (Amaruchkul & Lorchirachoonkul 2011). In some scenarios, ad hoc demand is typically not large enough to use all available cargo space. Therefore, carriers sell cargo capacity through freight forwarders to maximise space utilisation and to reduce carrier's risk of underutilisation of capacity on board their carriers (Gupta 2008). The MergeGlobal Value Creation Initiative (2008) explained that freight forwarders can take control of the end-customer relationship better than ocean container carriers.

Both volatility in cargo capacity and uncertainty in securing volume poses a challenge to carriers (Becker & Dill 2007). These cause carriers to rely on freight forwarders for volume and thereby reduce the risk of space loss. Risk sharing between freight forwarders and carriers for cargo volume management is also discussed in the literature (Hellermann 2006; Li & Zhang 2015). Due to door-to-door movement of goods, most liner shipping companies work in close collaboration with freight forwarders because shippers like to deal more with freight forwarders than with carriers. Freight forwarders accept LCL cargo from shippers and consolidate into full container load and ship to same destination, thereby reducing freight cost for shippers (Ding et al. 2016). Thus, enable them to attract shippers than carriers.

2.5 SELECTION OF LINER OPERATORS

The previous section showed the competitiveness of liner operators from the perspective of freight forwarders. One critical factor identified that influences the competitiveness of carriers in international business is cost, which in turn depends on logistics cost. The maritime sector not only carries more than 90% of international trade, but it is subject to high business and operational risks (United Nations Conference on Trade and Development 2009). As such, selecting the right carriers is critical to the success of international business.

Competitive ocean carriers often offer comprehensive, diverse services that reduce the need for shippers (and their representative) to deal with many parties in international freight and logistics (Chen et al. 2010). Competitive carriers tend to be better integrated with other service providers in the logistics chain in order to establish their name and build their reputation with customers (Van Der Horst & De Langen 2008).

A number of studies have been conducted to evaluate the competitiveness of carriers from a shipper's perspective. A number of factors were identified that influence a shipper's choice of carriers. For example, transit time and reliability were the most important factors identified that affect the decision of shippers (Swan & Tyworth 2001; Zhang & Lam 2015). As shown by Notteboom (2006), liner shipping companies are faced with challenges in developing a strong focus of liner services within short transit times, combined with a high degree of schedule reliability. Unreliable schedules and longer transit times increase the total landed costs of products, and unreliable transit time affects both cost and service, resulting in an increase in overall inventory costs (Tyworth & Zeng 1998; Vidal & Goetschalckx 2000).

Allen Mahmoud and McNeil (1985) and De Jong et al. (2014) explained that enhancement in transit time and reliability can make shippers more competitive in international trade, and that enhancement in a carrier's reliability has a great impact on the total cost for shippers. However, Durvasula, Lysonski and Mehta (2000) were of a different opinion, stating that shippers do not perceive transit time to be a high priority and therefore

do not consider the impact of ocean carrier transit time variability on their logistics costs. Even though the timing dimension of the carrier service was a significant predictor of shipper satisfaction, transit time, which is a measure of the timing dimension was not an important service characteristic observed by shippers (Lu 2003c). The empirical study of Gallagher (2010) revealed that shippers believe that better schedule reliability can reduce uncertainty and subsequently protect the safety stock level. Additionally, Wiesmann (2010) also showed that longer transit times directly increase shipper in-transit (goods in progress) inventory levels. Longer transit times can also extend the shipper's forecast dimension, thus, they are likely to increase safety stock needs leading to a high increase in production and total logistics costs (Wiesmann 2010).

The empirical investigation conducted by Lambert, Lewis and Stock (1993) revealed that shippers place a far greater emphasis on the quality of service delivered by carriers than on lower rates, in that the shippers may be willing to pay more for a better service. However, some shippers split the freight business among various carriers as a management strategy to mitigate risk associated with the transportation of goods (Brooks & Trifts 2008). The shipper's conception of not placing all eggs in one basket leads to a decision to deal with alternative sources for buying freight services to minimise and share risk among carriers.

2.5.1 CARRIER SELECTION THEORY: THE FREIGHT FORWARDER'S VIEW

It is virtually impossible for a carrier to provide a transport service that will coincide with the need of shippers and freight forwarders, because the transport service needs of freight forwarders and shippers is a derived demand. Ocean carriers must therefore understand the derived need of their clients in order to provide transport services that meet the demand of their clients. The selection of carriers by freight forwarders is guided by the underlying theory of value creation for shippers through supply chain management. According to Johansson (1993) any company, regardless of its operations, is guided by four parameters (cost, time, service and quality) in value creation. However, the competitiveness of liner operators can be

categorised into the three parameters of cost, transit time reliability, and service quality from the perspective of freight forwarders.

A freight forwarder is an agent who derives income from commission received, and the difference between the freight rate obtained from carriers, and the actual freight rate offered to the shippers may naturally tend to be cost oriented. However, service satisfaction that freight forwarders pursue in order to add value for their clients may cause them not to be as cost centered. Therefore, the selection of a carrier by freight forwarders is not a straight forward decision. The selection of a carrier based on the cost factor will reduce the overall product costs of the shippers as transport costs contribute to a significant portion of the overall price of a product. Non-cost factors may have an effect on other logistics attributes such as customers pipeline inventory costs, production cycles and warehouse costs.

Cost and non-cost factors can influence the selection of a carrier depending on the freight forwarder's needs. For example, if a freight forwarder is shipping non-urgent cargo with low value, then cost can become a key determinant. However, if a forwarder is shipping urgent cargo with high value, then non-cost factors (transit time reliability and service quality) can become more important than the cost factor. With increasing globalisation and e-commerce, an emphasis is now on the door-to-door delivery of cargo to consumers on-time in the international market. Thus, much more attention is given to total transit time reduction. Freight forwarders are constantly making decisions within these three parameters when selecting a carrier.

Cost is a critical issue with regards to the transportation of goods. During the early stages of industrial development speed was not considered necessary, and as a result, early researchers noted transport costs as the key determinant factor in carrier selection, and shippers and freight forwarders paid attention to the reduction in overall costs of products (Cohen & Lieberman 1949). Cook (1967) and Liberatore and Miller (1995) pointed out that cost was the key factor considered by freight service buyers when selecting a carrier for international transport, in that transport service buyers are willing to choose a carrier with a lower freight cost. Authors such as

Ganbat and Kim (2015) have noted that maritime freight forwarders operating between Korea and Mongolia are willing to accept carriers offering a reduced cost with less speed than a carrier with high cost and fast speed. That is, the freight forwarders were making a cost trade-off between the services provided by carriers.

Time has always been an issue in international transport. Unreliable transit time impacts logistics variables and results in a loss of sales by cargo owners, and it increases the pipeline costs for cargo owners, significantly affecting on-time arrival of goods to international markets. Unreliable transit times cause manufacturers to increase warehouse stock, which in certain scenarios leads to an obsolete product. Shippers run out of stock due to unreliable transit times, while less dependability causes higher inventory levels or a loss of productivity (Bardi 1973). Reliable transit times are more important to shippers than cost, because lower costs with unreliable transit times eventually leads to higher costs due to the knock on effect from the unreliable transit time (Maloni, Gligor & Lagoudis 2016).

Kent and Parker (1999) indicated that there are two (import and export) dimensions for shippers that determine which factor is more important in carrier selection. The authors noted that transit time reliability is more important to import shippers. Sales are quite sensitive to reliable transit times because reliable transit times enable cargo owners to plan their logistics processes in advance.

Service quality has attracted special attention in the literature, with the main focus of service quality being linked to customer satisfaction (Durvasula, Lysonski & Mehta 2000; Hu & Jen 2010). Assuming that cost and transit times for all carriers are the same within a specific route, then service quality can become a determining factor for carrier selection by freight forwarders. A basic requirement for ocean carriers in winning customer loyalty in competitive liner shipping market is customer satisfaction (Lam & Zhang 2014). Freight forwarders consider following elements important when determine a service quality provided by ocean carriers; (i) knowledgeability of carrier staff (MacGillavry & Wilson 2014), (ii) ability of carrier to respond to

queries on time (Yang & Sung 2016), (iii) willingness to negotiate service charges with customers (Kannan, Bose & Kannan 2012), (iv) the ability of the carrier to provide on-time information (Rajesh et al. 2011) and (v) the carrier staff attitude to care for problem-solving (Tax, Brown & Chandrashekar 1998). Liner shipping companies can differentiate themselves from their competitors through offering quality shipping service. "In fact, service quality has been recognised as a major marketing strategy for the liner shipping companies" (Frankel 1993, p.58). It is imperative for carriers to understand the service needs of their customers. This will make liner shipping companies to provide the required shipping services to their clients in order to win customer loyalty.

2.6 INFLUENTIAL FACTORS IN LINER OPERATOR SELECTION

Researchers have debated the subject of carrier selection, and a significant number of empirical studies have been carried out on the selection of carriers as a measure towards cost cutting for customers (Chang 2008; Leachman 2008; Panayides 2006; Pato 2010). However, these views on the important factors that guide shippers are based on past studies and tend to vary significantly. For example, in McGinnis (1989), speed and reliability are important factors in liner operator selection, while Kent and Parker (1999) argued that equipment availability, reliability, financial stability, on time delivery and service frequency are the important attributes considered by shippers when selecting an ocean container carrier. Brooks (1990) and Brooks (1991) stated that factors used by freight service buyers when purchasing liner services have changed, with transit time becoming a determinant factor considered by shippers when choosing a carrier. Brooks (1995) identified that on-time pickup and delivery, cost of service, problem-solving capability, and availability of equipment are the important factors observed by shippers and freight forwarders when choosing ocean container carriers.

According to the empirical results of most carrier selection studies, transit time reliability, reliability of pickup, reliability of delivery, and speed have been

the most predominant factors observed by shippers when choosing carriers (see for example Abshire & Premeaux 1991; Bardi, Bagchi & Raghunathan 1989; Crum & Allen 1997; Dobie 2005; Lambert, Lewis & Stock 1993; Premeaux 2002).

There is a high level of similarity between studies on the influential factors in liner operator selection. A number of studies have shown some level of comparability and have identified the speed factor as the most important factor perceived by shippers among carrier selection factors in earlier research (see studies such as Bardi 1973; Daughety & Inaba 1977; McGinnis 1978; Stephenson & Vann 1981).

Bardi, Bagchi and Raghunathan (1989) examined carrier selection criteria in a deregulated environment and found that transit-time reliability or consistency, door-to-door transportation rates or costs and total door-to-door transit times were the three most important ranking factors observed by shippers when choosing carriers. The authors further mentioned that transit-time reliability was perceived by shippers as the most important factor due to the utilisation of just-in-time concepts which require an uninterrupted flow of goods from vendors to buyers (Bardi, Bagchi & Raghunathan 1989). The earlier studies under deregulated environment tend to concentrate on time reliability as that was the period where manufacturers' emphasis in replacing warehousing of spare parts and semi-finished products with just-in-time arrival of consignments.

The reliability of on-time delivery, on-time pickup, and total transit time are factors considered by shippers as the most important ones for carrier selection (Abshire & Premeaux 1991). Lambert, Lewis and Stock (1993) examined 18 attributes in customer-focused strategies for the selection of carriers, and found that the three most important factors perceived by shippers when choosing carriers were the quality of dispatch personnel honesty, on-time pickup and on-time deliveries. However, the shippers placed a far greater emphasis on on-time service delivery by carriers than on low rates. Similarly, Pedersen and Gray (1998) identified reliability as the number one rated factor that was valued by shippers and freight forwarders.

Empirical analysis of 22 carrier selection attributes by Crum and Allen (1997) revealed that pickup and delivery reliability, transit time reliability and rate level were the three most influential factors affecting the decision making of the respondents. Premeaux (2002) analysed 36 carriers' selection elements and found that the three most important ones emphasised by customers were reliability of on-time delivery; reliability of on-time pickup; and financial stability of the carrier, which affirmed the three important factors identified earlier in the study of Crum and Allen (1997).

As mentioned, the most influential factors in liner operator selection can be grouped into three broad categories, namely, transit time, service quality and cost or freight rate. Even though service quality tends to be an important factor observed in earlier studies, the current understanding of important carrier selection factors tends to focus on cost and transit time reliability.

Recent studies have considered factors affecting the choice of carrier by shippers and freight forwarders separately, with major studies focused on the perspective of the shippers. A number of researchers have taken the time to analyse carrier selection factors by sampling views of shippers and freight forwarders together (see for example Gailus & Jahn 2013; Kokkinis, Mihiotis & Pappis 2006; Tuna & Silan 2002).

Gailus and Jahn (2013) conducted an empirical study by splitting the freight market in two, that is, into contractual and spot markets. The findings of their analysis revealed that freight rate, equipment availability and quality, and reliability were the three most important factors observed in the contractual market, while freight rate, quality documentation, and information quality were the three other most important factors seen in the spot market by freight forwarders and shippers when choosing ocean container carriers. The authors' findings fall under two different market conditions showing that freight rate is the common important factor perceived by freight transport service buyers in the two markets.

The debate on the critical factors that influence choice of ocean container carrier have attracted the attention of researchers because of their

implications for the market share of liner shipping companies (see for example Holcomb & Manrodt 2000; Kokkinis, Mihiotis & Pappis 2006; Wen & Lin 2010; Zurheide & Fischer 2012). For that reason researchers have focused on condensing carrier selection elements into major factors in order to identify the critical factors affecting competitiveness for ocean carriers (Dobie 2005; Lirn & Wong 2013; Yuen, Thai & Dahlgaard-Park 2015). The fact that carrier selection elements affect the competitiveness of carriers has been well discussed in the literature as shown in Table 2.1.

Table 2.1: Influential Factors in Liner Operator Selection

Item No	Factor	Associated benefit from the shipper's perspective	Studies
1	On time pick-up	Ability of carriers to pick-up cargo at the exact time given to customers	Lambert, Lewis and Stock (1993), Crum and Allen (1997), Pedersen and Gray (1998), Zsidisin, Voss and Schlosser (2007), Mohammaditabar and Teimoury (2008), Qureshi, Kumar and Kumar (2008), Wong, Yan and Bamford (2008), Premeaux (2010), Ben-Akiva, Bolduc and Park (2013), Lin and Yeh (2013)
2	On time delivery	Carrier's ability to deliver cargo on time	Abshire and Premeaux (1991), Tuna and Silan (2002), Dobie (2005), Voss et al. (2006), Premeaux (2010), Ben-Akiva, Bolduc and Park (2013), Lin and Yeh (2013)
3	Service schedule reliability	Carrier's ability to be reliable to sailing time	Lu (2003b), Lu (2007), Wen and Huang (2007), Brooks and Trifts (2008), Van Der Horst and De Langen (2008), Saldanha et al. (2009), Chou (2010), Banomyong and Supatn (2011), Feo, Espino and García (2011), Brooks et al. (2012), Wang and Meng (2012b), Gailus and Jahn (2013), Lirn and Wong (2013), Lam and Zhang (2014)
4	Frequency of calls	How frequent does the line call at specific ports	Bagchi (1989), Brooks (1990), Abshire and Premeaux (1991), Pedersen and Gray (1998), Kent and Parker (1999), Gibson, Rutner and Keller (2002), Lu (2007), Brooks and Trifts (2008), Banomyong and Supatn (2011), Brooks et al. (2012), Gailus and Jahn (2013), Lirn and Wong (2013), Van den Berg, Roy and De Langen (2014a), Zhang and Lam (2014)
5	On time release of documents	Ability of carrier to release delivery order and other documents	Lu (2007), Wong, Yan and Bamford (2008), Kannan (2010), Kannan, Bose and Kannan (2011)

		on-time	
6	Reliability of transit time (port to port)	Ability of carrier to stick to announced transit time	McGinnis (1990), Abshire and Premeaux (1991), Crum and Allen (1997), (Kent & Parker 1999), Dobie (2005), Wen and Huang (2007), Brooks and Trifts (2008), Mohammaditabar and Teimoury (2008), Wong, Yan and Bamford (2008), Notteboom and Vernimmen (2009), Boile, Lee and Theofanis (2012), Brooks et al. (2012), Gailus and Jahn (2013), Maloni, Paul and Gligor (2013), Lin and Yeh (2013), Van den Berg, Roy and De Langen (2014b)
7	Direct sailing (port to port)	Calling direct to particular ports and being reliable without re-routing	Brooks (1990), Lambert, Lewis and Stock (1993), Lu (2007), Van Der Horst and De Langen (2008), Kannan, Bose and Kannan (2011), Brooks et al. (2012), Wang and Meng (2012a) Wang and Meng (2012b), Lirn and Wong (2013), Zhang and Lam (2014)
8	Competitive freight rates & charges	Carrier's ability to offer competitive freight rates and the flexibility to negotiate rates	Dobie (2005), Bolduc, Renaud and Boctor (2007), Brooks and Trifts (2008), Mohammaditabar and Teimoury (2008), Qureshi, Kumar and Kumar (2008), Haralambides and Acciaro (2010), Alizadeh and Nomikos (2011), Banomyong and Supatn (2011), Holguín-Veras et al. (2011), Van den Berg and Langen (2011), Boile, Lee and Theofanis (2012), Brooks et al. (2012), Meixell and Norbis (2012), Ben-Akiva, Bolduc and Park (2013), Gailus and Jahn (2013), Lirn and Wong (2013), Maloni, Paul and Gligor (2013), Chu (2014), MacGillavry and Wilson (2014)
9	Container detention free period	Ability for the carrier to offer a detention free period to customers	Wen and Huang (2007), Kannan (2010), Kannan, Bose and Kannan (2011), Gailus and Jahn (2013), Lirn and Wong (2013), Rodrigue, Zumerchik and Ogard (2013)
10	Ability to offer door-to-door transportation rates	Carrier's ability to offer door-to-door rates	Bardi, Bagchi and Raghunathan (1989), Abshire and Premeaux (1991), Brooks (1995), Wen and Huang (2007), , Fransoo and Lee (2013), Van den Berg, Roy and De Langen (2014b)
11	On time quoting of rates and charges	Shipping line's ability to provide an on time quote and charges to the clients	Brooks (1995), Engelen et al. (2011), Ülkü and Bookbinder (2012), Zhao, Stecké and Prasad (2012)
12	Professionalism of carrier staff	Carrier front desk staff professionalism and duty of care to customers	Brooks (1995), Lu (2007), Wen and Huang (2007), Mohammaditabar and Teimoury (2008), Banomyong and Supatn (2011), Kannan, Bose and Kannan (2011), Lam and Zhang (2014)

13	Ability of carrier staff to problem solve	Ability of carrier staff to solve problems or their commitment to solve issues	, Voss et al. (2006), Lu (2007), Wen and Huang (2007), Gailus and Jahn (2013), MacGillavry and Wilson (2014)
14	Prompt response to customer complaints	Ability of carrier to respond to problems on time	Brooks (1995), Ng and Yu (2006), Lu (2007), Wen and Huang (2007), Mohammaditabar and Teimoury (2008), Lam and Zhang (2014)
15	Shipping line staff politeness and courtesy to client	Politeness of carrier staff to customers	Lu (2007), Premeaux (2010), Banomyong and Supatn (2011), Kannan, Bose and Kannan (2012), Gailus and Jahn (2013)
16	Accuracy of shipping documents	Issuing Bill of Lading and other shipping documents without error	Voss et al. (2006), Lu (2007), Wen and Huang (2007), Mohammaditabar and Teimoury (2008), Banomyong and Supatn (2011), Kannan, Bose and Kannan (2011), Rajesh et al. (2011), Gailus and Jahn (2013), Lirn and Wong (2013)
17	On time invoicing by the shipping line	Shipping line issuing of invoicing on time	Brooks (1995), Ng Ferrin and Pearson (1997), Dobie (2005), Banomyong and Supatn (2011), Premeaux (2011), MacGillavry and Wilson (2014)
18	On time submission of the cargo manifest by the shipping line	Ability of the shipping line to submit the cargo manifest to authorities on time	Ng and Yu (2006), Banomyong and Supatn (2011), Bichou (2011), Hoffman Lusanga and Bhero (2013), Knowler (2014)
19	Cargo safety management	Shipping line's safe handling of cargo without damage	Dobie (2005), Lu (2007), Wen and Huang (2007), Mohammaditabar and Teimoury (2008), Wong, Yan and Bamford (2008), Premeaux (2010), Rajesh et al. (2011), Li, Zheng and Hensher (2012)
20	Quality and capacity of cargo handling facilities and equipment	Carriers provision of special equipment for the handling of special cargo	Abshire and Premeaux (1991), Voss et al. (2006), Wen and Huang (2007), Mohammaditabar and Teimoury (2008), Premeaux (2010), Banomyong and Supatn (2011), Gailus and Jahn (2013), Lirn and Wong (2013)
21	Carriers ability to provide late hour services	Carriers ability to provide late hour services to clients	Kent and Parker (1999), Wen and Huang (2007), Mohammaditabar and Teimoury (2008), Wong, Yan and Bamford (2008), Banomyong and Supatn (2011), Kannan, Bose and Kannan (2011), Premeaux (2011), Ben-Akiva, Bolduc and Park (2013), Lam and Zhang (2014)
22	Carrier using renewable	Carrier's reputation for using efficient means	Mohammaditabar and Teimoury (2008), Banomyong and Supatn (2011), Premeaux

	energy	of handling to avoid harm to the environment	(2011), Rajesh et al. (2011), Ben-Akiva, Bolduc and Park (2013), Gailus and Jahn (2013), Tseng, Ding and Li (2013), Chu (2014)
23	On-time information sharing of arrival and departure	Ability to provide on time information to customer on cargo's ETA / ETD	Lu (2007), Qureshi, Kumar and Kumar (2008), Kannan, Bose and Kannan (2011), Premeaux (2011), Rajesh et al. (2011)
24	Cargo tracking	Carrier's providing cargo tracking & tracing service to clients	Dobie (2005), Grosso (2011), Banomyong and Supatn (2011), Lirn and Wong (2013), Van den Berg, Roy and De Langen (2014a)
25	On time issuing of B/L	Ability to issue Bill of Lading as soon as the cargo is loaded on board	Voss et al. (2006), Wen and Huang (2007), Mohammaditabar and Teimoury (2008), MacGillavry and Wilson (2014)
26	Availability of online booking	Availability of online booking	Lu (2003a), Lu (2007), Kannan, Bose and Kannan (2011),
27	Geographical coverage by the shipping line	Geographical spread and cover of carrier services	Bottani and Rizzi (2006), Ng and Yu (2006), Mohammaditabar and Teimoury (2008), Qureshi, Kumar and Kumar (2008), Wong, Yan and Bamford (2008), Banomyong and Supatn (2011), Ducruet, Cesar and Notteboom (2012)
28	Environmentally friendly operations by the shipping line	Carrier's adoption of environmentally friendly operations	Bloor et al. (2013), Lirn and Wong (2013), Lam and Zhang (2014), MacGillavry and Wilson (2014), Van den Berg, Roy and De Langen (2014b)
29	Carriers commitment to reducing CO2 emissions	Shipping line's commitment to reducing CO2 emissions	Corbett, Wang and Winebrake (2009), Eng-Larsson and Kohn (2012), Song and Xu (2012), Bloor et al. (2013), Maloni, Paul and Gligor (2013), , Van den Berg, Roy and De Langen (2014a)
30	Shipping company's reputation	Reputation of the carrier in the past year concerning its total operation delivery	Voss et al. (2006), Wen and Huang (2007), Mohammaditabar and Teimoury (2008), Qureshi, Kumar and Kumar (2008),
31	Carrier staff knowledge	Knowledgeability of shipping line sales personnel about the type of service that customer's need	Abshire and Premeaux (1991), Wen and Huang (2007), Mohammaditabar and Teimoury (2008), Yang, Marlow and Lu (2009), Premeaux (2010), MacGillavry and Wilson (2014)
32	Shipping line's provision of emergency	Shipping line's provision of urgent services to client	Voss et al. (2006), Wong, Yan and Bamford (2008), Gailus and Jahn (2013), Lirn and Wong (2013),

	services		
33	Transparency of freight rates and charges	Carriers offering of transparent freight rates which are negotiable	Matear and Gray (1993), Nir, Lin and Liang (2003), Angelidis and Skiadopoulos (2008), Wong and Boon-itt (2008), Saldanha et al. (2009)
34	Simplicity of freight rates and their structure	Shipping line's ability to offer simple freight rates and their structure	Banomyong and Supatn (2011), Ben-Akiva, Bolduc and Park (2013), Gailus and Jahn (2013), Lirn and Wong (2013), Maloni, Paul and Gligor (2013), Chu (2014)
35	Dedicated berth by shipping line	Shipping lines having dedicated berth	Guy and Urli (2006), Frémont (2009), Soppé, Parola and Frémont (2009), Theofanis, Boile and Golias (2009), Lam and Dai (2012)
36	Ability to obtain berth on arrival	Shipping line's ability to obtain berth on arrival	Imai, Nishimura and Papadimitriou (2003), Tiwari, Itoh and Doi (2003), Notteboom (2006), Tongzon (2009),
37	Corporate social responsibility by the shipping line	Shipping line's ability to engage in or offer corporate social responsibility	Wong, Yan and Bamford (2008), Pawlik, Gaffron and Drewes (2012), Skovgaard (2012), Van den Berg, Roy and De Langen (2014a)
38	Ability to coordinate other actors	Shipping line's ability to coordinate other network actors	Notteboom and Rodrigue (2009), Fransoo and Lee (2013), Van den Berg, Roy and De Langen (2014a)
39	Ability to provide freight and logistics services for other types of cargo	Shipping line's ability to provide freight logistics services for different types of cargo	Van Der Horst and De Langen (2008), Frémont (2009), Notteboom and Rodrigue (2009), Heaver (2010), Yang (2012a), Van den Berg, Roy and De Langen (2014b) Wagener (2014)

Table 2.1 gives summary of important carrier selection elements observed by the past studies. It shown various range of carrier selection elements identified in the literature. Each selection element shown in Table 2.1 was considered important by more than six studies for the past decade. The conceptual framework development in Chapter 3 will be based on Table 2.1 and subsequently questionnaire design in Chapter 4 shall also be based on Table 2.1. There has been a significant shift through the literature on the important selection criteria over a period of time as shown in Table 2.1. However, cost and time reliability factors remain consistent as the important factors perceived by shippers and freight forwarders across different regions.

Though Asian freight forwarders and shippers tend to consider service factor, however, cost factor also played a critical role in their decision making of choosing a carrier. Statistical analysis conducted by Mohammaditabar and Teimoury (2008) applied an analytical hierarchy process to 22 selection elements and identified five dimensions of factors which were affecting the selection of ocean carriers by big shippers such as cost, insurance of service provision, handling services, customer service and strategic compatibility.

Qureshi, Kumar and Kumar (2008) used fuzzy Multiplication Applique a un Classement or cross impact matrix-multiplication applied to classification (MICMAC) analysis to examine 15 selection criteria and they were able to reduce the selection criteria to 5 major factors. However, the authors noted that the identified factors were interdependent of each other, and no single factor was self-sufficient to influence the selection of ocean carriers from the shipper's perspective, except that the cost factor remained relevant.

Cost was the important factor identified by Boile, Lee and Theofanis (2012) to influence the decision making of shippers, the authors used bi-level modelling to examine shippers and carriers interaction and found that shippers perceived pricing as most important in their dealing with carriers.

Empirical analysis conducted by Lam and Zhang (2014) on the selection of maritime service providers used an analytical hierarchy process to condensed several carrier selection elements into key influential factors of cost control, reliability, responsiveness, public image and value-added services, of which cost was rated as the number one factor.

Lirn and Wong (2013) employed a fuzzy analytic hierarchy process to investigate transport selection factors, and found that the overall cost was the most important service dimension that influenced freight transport service purchasing. The empirical analysis conducted by Chu (2014) on carrier choice among large-sized and medium-sized freight forwarding firms revealed that the offering of shipment discounts, low rates of damage, and service were consistent as key influential factors.

Environmentally friendly operations have become a dominant issue considered by transport service buyers. Carbon emission reduction has caught the attention of transport service buyers when choosing a shipping company for international transportation of goods (Wanke et al. 2015; Woolford & McKinnon 2011). Freight forwarders who act as intermediaries between shippers and shipping lines play a role in carbon emission reduction through the selection of carriers and consignment routing (Woolford & McKinnon 2011). The reduction of carbon emissions is an emerging issue that is attracting strong debate among transport service buyers (Song & Xu 2012). According to Corbett, Wang and Winebrake (2009) ocean container ships emit more greenhouse gases (GHGs) than most other ocean vessel classes, and therefore, they attract the attention of maritime transport service purchasers (Maloni, Paul & Gligor 2013). Van den Berg, Roy and De Langen (2014a) empirically analysed the attitude of shippers and freight forwarders assessing the intermodal value chain proposition. They introduced the factor of 'sustainable operations,' that is, carbon emission reduction as a relevant service factor considered by freight forwarders.

Even though technology is playing critical role in the maritime industry and enabling liner shipping companies to increase capacity without increasing operation cost, it did not receive much attention in literature with regards to carrier selection criteria as shown in Table 2.1. Wen and Huang (2007) applied factorial analysis to investigate the selection factors of ocean container carriers and found that transit time, frequency of sailing, a record of cargo delay, freight rate, speed/reliability and convenience are the important factors influencing the choice of ocean carriers. Table 2.1 shown that earlier studies do not consider service quality factor important, however, service quality became important factor in recent studies (see for example Huang, Bulut & Duru 2015; Yuen, Thai & Dahlgaard-Park 2015).

2.7 LINER OPERATOR SELECTION: NATIONAL PERSPECTIVES

The literature also clearly indicates that views on carrier selection criteria vary across countries. For example, service quality and equipment availability

tend to be more important to Asian companies than European or North American companies (Gailus & Jahn 2013). From the regional perspective, ocean container carrier selection has been well discussed in the literature as shown in Table 2.2. Transit time reliability and on-time delivery have been identified as the predominant factors observed by United States studies as shown in Table 2.2. Although the rating of factors varies slightly, transit time and on-time delivery remained the important factors for United States shippers.

Table 2.2: Carrier Selection Factors from a Regional Perspective

Literature	Factors	Countries covered in the study
Lu (2007)	Operation capability, customer service	Taiwan
Wen and Huang (2007)	B/L Accuracy, ability to trace shipments and pick-up/delivery services	Taiwan
Wong, Yan and Bamford (2008)	Customer service and cargo handling capabilities	Taiwan
Hu and Jen (2010)	Service quality and customer loyalty	Taiwan
Chung, Chung and Tai (2011)	Sales representative's expertise and transportation reliability	Taiwan
Shang and Lu (2012)	Customer responses	Taiwan
Yang (2012a)	Logistics service reliability	Taiwan
Lin and Yeh (2013)	Reliability, delivery cost and time	Taiwan
Lirn and Wong (2013)	Total cost, cargo quality control, carrier service attributes	Taiwan
Chu (2014)	Discount offering, low rate of damage and service consistent	Taiwan
Wen and Lin (2015)	Service performance, reputation, freight charges and information technology	Taiwan
Banomyong and Supatn (2011)	Accuracy of documents, freight rates	Thailand
Setamanit and Pipatwattana (2015)	Reliability of service, quality of service, cost and after-sale service	Thailand
Abshire and Premeaux (1991)	Total transit time, carrier's leadership in offering more flexible rates	US
Lambert, Lewis et al. (1993)	On-time pickups, on-time delivery, competitive rates	US
Murphy and Daley (1995)	Freight charges, tracking and expediting shipments	US
Crum And Allen (1997)	Transit time, pickup & delivery reliability	US
Gibson, Rutner et al. (2002)	Cost, effectiveness, trust, flexibility	US
Zsidisin, Vosset et al. (2007)	On-time delivery performance	US
Premeaux (2010)	Flexible rates, response to emergency, IT	US
Ben-Akiva, Bolduc and Park (2013)	Quality service and total logistics costs	US

Maloni, Paul et al. (2013)	Transit time, CO ₂ reduction operations	US / ASIA
Brooks (1995)	Rate, problem-solving capabilities of the carrier, availability of equipment	US/Canada and Europe
Gailus and Jahn (2013)	Reliability, transit time	Germany
Kannan, Bose and Kannan (2011)	Low rate, pricing flexibility and flexibility	India
Van den Berg, Roy and De Langen (2014a)	Cost driven	Netherlands
Lam and Zhang (2014)	Cost control, reliability and responsiveness	Singapore
Harrison and Fichtinger (2013)	Time, schedule, transit time and frequency	UK

As shown in Table 2.2, developed countries are increasingly perceiving cost related factors as the key determining factor in ocean carrier selection (See Van den Berg and De Langen 2014). Contrary to this, developing countries are shifting from cost related factors as key determining factors to service quality related factors as the most influential issues in liner carrier selection (Setamanit and Pipatwattana 2015), due to the growing demand of e-business in most developing countries, especially from Asian countries. This is because goods need to reach their intended destination in real time.

The statistical analysis conducted by Van den Berg, Roy and De Langen (2014a) on how shippers and freight forwarders assess liner shipping companies in the Netherlands found that both customers are mainly cost driven, but that freight forwarders to a certain degree attach more importance to sailing frequency. The findings of their study is different from similar studies conducted in Taiwan.

The empirical analysis conducted by Wen and Lin (2015) on freight forwarders operating between Taiwan and Southern China applied factorial analysis and found that large freight forwarding companies pay more attention to freight charges and advanced information technology, while small freight forwarding companies pay considerably more attention to service performance and the reputation of the liner shipping company. Chung, Chung and Tai (2011) evaluated ocean container carrier selection factors perceived by Taiwanese freight forwarders, and applied the fuzzy Delphi method on the data discovering that the expertise of sales representatives and transportation reliability were the most important factors valued by ocean

freight forwarders in Taiwan. However, the result was dependent on the size and scope of the freight forwarding companies.

An analytical study conducted by Shang and Lu (2012) which evaluated the most influential selection factors perceived by freight forwarders in the Taiwanese maritime industry applied structural equation modelling and revealed that customer relationship management, that is, customer responses are the most important factor to the freight forwarders when purchasing transport service from the ocean container carriers.

Yang (2012a) conducted an empirical investigation on identifying the critical logistics service attributes of ocean freight forwarders in Taiwan by applying factorial analysis, and found that capability for logistics service reliability was the most valuable capability for ocean freight forwarders, followed by flexibility capability, logistics value-added service capability, and logistics information service capability. Lin and Yeh (2013) analysed carrier selection factors in the Taiwanese market by applying a multi-commodity reliability model and found that delivery cost and time were the most significant attributes to customers for their optimal choice of carriers.

Freight charges, tracking and expediting shipments were the factors identified as the most important for influencing decision making among freight forwarders in the US market when purchasing the services of ocean carriers (Murphy & Daley 1995). Zsidisin, Vosset et al. (2007) investigated US shippers to find the factors that they considered important when choosing carriers, and they identified that on-time delivery was the most important factor because shippers planned their cargo delivery in advance and therefore relied on prompt delivery.

Kannan et al. (2012) investigated influential factors affecting ocean container carrier selection from the perspective of Indian shippers and identified that they were cost oriented. Therefore, they perceived that low rates were the important factor that underpinned their decision making.

Though carrier selection factors differ from regional perspectives, within the same geographical region the important selection criteria also tends to differ

based on client type, for example, between either shipper or freight forwarder. Even within the same client type, selection criteria tend to differ according to the customer's segment, that is, that of small freight forwarding companies or those of big freight forwarding companies. The size of the freight forwarding company has a significant impact on the influential factors observed when selecting ocean carriers because smaller freight forwarders tend to consider different factors than bigger freight forwarders do, and hence their evaluation of carrier competitiveness may differ from one another (Fanam, Nguyen & Cahoon 2015).

Given the importance of differences in factors determining carrier selection from the perspective of different countries, this study considers ocean container carrier selection from the perspective of Ghana, as little or no empirical research has been done from within the African context, and of Ghana specifically. Ghana is an emerging market in Africa and it is striving to be a gateway to West Africa, thereby attracting leading liner shipping companies such as the Maersk Line, the Mediterranean Shipping Line, CMA CGM, and the Evergreen Shipping Line. Most of the leading shipping companies are using Ghana as a transshipment hub for goods destined to and from the West African sub region. Therefore, undertaking a study on liner operator selection criteria would throw light on how freight forwarders select ocean container carriers in Ghana.

2.8 SUMMARY

Given the limited number of studies on liner operator selection and their varied and even conflicting views, there is a need for further research in this area. It is important that current research benefits from a synthesis of the views of previous studies on liner operator selection from the freight forwarder perspective. Thus the current study is expected to help develop a better understanding of the factors important to liner operator competitiveness from the perspective of freight forwarders.

The last section also demonstrates that liner operator selection criteria tend to vary from one country to another, while limited research has been done on

developing countries. As such, the current study seeks to fill this gap in the literature through its focus on Ghana's liner shipping, which has not previously been considered.

To understand the critical factors influencing decision making of freight forwarders, this study must first understand their buying behaviour. Thus, in Chapter 3 the buying behaviour of freight forwarders shall be discussed. The conceptual framework that reveals the factors influencing freight forwarders' choice of ocean carriers is also discussed in Chapter 3.

CHAPTER THREE

CONCEPTUAL FRAMEWORK DEVELOPMENT AND JUSTIFICATION

CHAPTER 3 CONCEPTUAL FRAMEWORK DEVELOPMENT AND JUSTIFICATION

3.1 INTRODUCTION

This chapter presents the conceptual framework of the present study and hypothesised relationships that emerge from it. The extant literature review in preceeding chapter help to identify carrier selection criteria influential to the choice of liner operators. The proposed conceptual framework observes the factors that freight forwarders perceive to influence them when they choose ocean container carriers. It looks at the direct effects that these carrier selection factors have on the competitiveness of ocean container carriers. It helps to devise not only an evaluation of the importance that each factor has on the competitiveness of ocean container carriers, but also the framework can be applied to validate the theoretical and practical knowledge of these factors affecting ocean container carrier competitiveness.

Four sections are included in this chapter. The next section 3.2 discusses freight forwarder's buying behaviour with regards to their decisions around choosing freight transport services. Section 3.3 explains the conceptual framework and the factors influential in freight forwarder's choices of ocean carrier, and section 3.4 provides a summary of the chapter.

3.2 FREIGHT FORWARDERS' BUYING BEHAVIOUR

The present study cannot evaluate the factors that influence the decision-making of freight forwarders without first considering their buying behaviour. There must first be a critical review of freight forwarder buying behaviour in order to identify factors that affect the competitiveness of ocean container carriers from the perspective of freight forwarders. This section explores the buying decision process they use when selecting liner operators. It is important to understand these buying processes as they significantly affect how freight forwarders choose which carrier to use.

There are various buying decision models employed in the field of business research. However, the current study will employ the Buy-grid Decision

Model because it is widely used to analyse freight transport service buying decisions.

The Buy-grid Model is widely applied by researchers in carrier selection (see Gailus & Jahn 2015; Wong, Yan & Bamford 2008). The Buy-grid Model was chosen over other models due to its ability to reveal the detailed processes of each stage of organisational decision-making within international procurement processes, and its ability to identify that organisational buying behaviour depends more on the buying situation than on the type of product, as well as which elements influence the purchasing decision. It also is able to reveal how freight forwarders expectations and behaviour changes according to whether the transport service is purchase new, a modified rebuy or a straight rebuy (Jerrold 2014).

Understanding the buying behaviour of freight forwarders will help to identify critical factors considered by them when selecting liner operators. Understanding freight forwarders buying behaviour is one of the great marketing tools an ocean container carrier can use for uncovering freight forwarders' desires in order to satisfy their needs. Lack of knowledge about customer buying behaviour is one of the main reasons why companies fail to attract people to purchase their services (Baker & Parkinson 2016). A company's knowledge about freight forwarders buying behaviour is considered an important marketing strategies (Maloni, Gligor & Lagoudis 2016). For that reason it is imperative for liner shipping companies to understand the buying behaviour of freight forwarders in order to better understand the decision-making processes of them.

Freight forwarders buying behaviour is not well understood in the maritime industry (Tushevska 2014), and there is also a lack of knowledge about maritime transport service buying behaviour (Shin 2015). Of these, the buying behaviour of import organisations is especially underrepresented in the literature (see for example Baker & Parkinson 2016; Liang & Parkhe 1997; Oosterhuis, Molleman & van der Vaart 2013; Van der Vaart & Van Donk 2006; Van Winter 2007). The reasoning process that freight forwarders follow in making freight service purchasing decisions is fundamental to

responsive competitive strategy. Hutt and Speh (2012) found that for organisations to survive competition in a competitive environment with regards to increase in market share, they must evaluate and understand the buying behaviour of their customers. Therefore, liner shipping companies must understand and evaluate the buying behaviour of freight forwarders in order to increase their market share.

Freight forwarder buying behaviour can be categorised into three models, namely task, non-task and complex models (Hutt & Speh 2012; Lillie & Sparks 1993). The task model focuses primarily on economic factors of any decision. Though considerations of constrained choice and reciprocity can be included, the emphasis on economic factors in task models invalidates their application alone for the buying decision of freight forwarders, as other factors are likely to exist. Lillie and Sparks (1993) considered these models incomplete because rationality and simplicity cannot be assumed in descriptions of buying behaviour in formal organisations. Hence, cannot be applied to analyse freight forwarders buying decisions. The non-task model involved the influences of human factors such as personal satisfaction and status, risk minimisation, and the individual buyer/seller relationships which can be anticipated as important in the process of freight forwarders selecting carriers. The complex model introduces an empirically-based two-dimensional model that is a “Buy-grid Model” which is highly relevant in analysing the decision making of freight forwarders. The Buy-grid Model is further discussed in the next section.

An organisation's buying decisions may vary from product to product for the same organisation and also the same transport service may elicit very different buying behaviour from different organisations. Therefore, it is important to understand freight forwarders' transport service buying behaviour. The buying behaviour of shippers is different from freight forwarders because their transport service buying objectives are different from that of the freight forwarders. The types of organisations involved in the decision, the time frames of the decision and the criteria used to evaluate the

decision, as well as their information sources, may greatly influence the outcome of decisions (Brooks 1984; Fanam, Nguyen & Cahoon 2016).

The present study will not discuss factors influencing ocean carrier selection from the freight forwarder perspective without first analysing their buying decision behaviour. Within the context of the buying decision, an analysis of buying behaviour is essential in business-to-business processes (Malaval, Bénaroya & Aflalo 2014). The Buy-grid Model process is important to understand freight forwarders decision making. The next section discusses Buy-grid Model.

3.2.1 THE BUY-GRID DECISION PROCESS

The Buy-grid Model was first introduced by Robinson, Faris and Wind in 1967 to analyse complex organisational buying behaviour around how organisations or buyers make decisions during the buying process. The organisational buying decision evolved from the state of the buying situation (that is at which stage the buying decision or a if service purchase is a new service, or a regular service purchase) to the buying process (through what phases or process that buying is conducted) and the buying centre (who is involved in the buying process) (Robinson, Faris & Wind 1967).

The above model has been conceptualised into two dimensions: the Buy-phase and Buy-class models (Van Winter 2007). The buy-phase dimension involves the process of organisational buying, and this process shows eight basic stages of activity performed in a buying situation. While, the buy-class dimension incorporates essential elements of the buying situation into the buy-grid framework. This framework distinguishes three different forms of buy-class: a new task, modified re-buy, and straight re-buy. The buy-classes “represent a continuum ranging from a transport service a freight forwarder has not previously purchased (new task) through purchasing same transport service via a different carrier or with changes in some carrier selection elements (modified rebuy) to transport service the freight forwarder regularly buys in a routine fashion (straight rebuy)” (Bellizzi & McVey 1983 p. 57).

Table 3.1 shows the phases of the buy-class where the process to buy will continue until the decision is made either to purchase or to not purchase a transport service. Table 3.1 gives a summary of the buy-phase within the buy-class with critical points. Under the phases of the buy-class a freight forwarder decision evolved from the stage of identification of a need for carrier service through the consideration of cargo characteristics to the evaluation of carriers where a freight forwarder quantify either carrier have satisfy all requirement (YES) before a decision is make to use carrier.

Table 3.1: Buy-Phases Included in Each Buy-Class of the Buy-Grid Framework

Buy-class Buy-phase		New task	Modified rebuy	Straight rebuy
1	Anticipation or recognition of a problem (need) and a general solution	YES	YES	YES
2	Determination of characteristics and quantity of needed items	YES	N/A	N/A
3	Description of characteristics and quantity of needed item	YES	N/A	N/A
4	Search for and qualification of potential sources	YES	N/A	N/A
5	Acquisition and analysis of proposals	YES	N/A	N/A
6	Evaluation of proposals and selection of suppliers	YES	YES	N/A
7	Selection of an order routine	YES	YES	YES
8	Performance feedback and evaluation	YES	YES	YES

Source: Adapted from Brooks (1984 p.36)

YES: most critical phase(s) of buy-class

Freight forwarder under a new task buy-class perceived the need to be totally different from previous times and needs, and as a result, a substantial amount of information was required for them to investigate alternative ways of satisfying that need and finding potential suppliers (Lillie & Sparks 1993). New tasks are a situation where no previous solution exists and there is little

or no relevant past buying experiences available for freight forwarders to consider.

Within the context of the modified rebuy buy-class, freight forwarding organisations take into consideration that it may be advantageous to re-evaluate alternatives despite having well-defined criteria designed to satisfy their transport service buying needs. Alternative carriers may be known but changed and additional information is needed before freight forwarder can make a decision, thus, differentiation by carriers may be a key advantage in demonstrating the superior capabilities over competing carriers. Within a modified rebuy there exists the need for intense marketing strategies by the carriers to attract buyers. Robinson, Faris and Wind (1967) and Lillie and Sparks (1993) explained that when encountering a buyer within the buy-class of modified rebuy that the direction of a supplier's marketing effort is dependent upon whether the supplier is an "in" or an "out" supplier. An "in" supplier is a supplier who has already established a working relationship with the buyer, and must strive to satisfy the buyer's present and future needs and move the buyer to a straight rebuy situation. An "out" supplier is a supplier who currently does not deal with the prospective buyer, thus they may increase their appeal to the buyer through offering guarantees or discounts as part of the proposal in order to attract buyers into purchasing their service or product.

A straight rebuy buy-class is seen to occur when there is the recurring requirement of one buyer upon a supplier. The decision process engaged in by buyers within this buy-class may be described as that of a routinised transaction, only with listed suppliers. The carriers not on the list are not considered, little new information is required, and what is required is not complex. Transport service buyers within straight rebuy situations have developed a well-defined selection criteria for choosing their transport service supplier and have a strong predisposition towards one supplier's offerings (Lillie & Sparks 1993). Thus, transport service buyers do not go through the buying decision processes of a new task or modified rebuy. The assurance of carrier and its performance are necessary to persuade the freight forwarders

to continue using the carrier's service, and personal commitments in the carrier-freight forwarder relationship become more important in a straight rebuy.

The Buy-class concept is seen as critical to the Buy-grid framework since the three types of buy-classes impact on the number of stages undertaken, and the intensity of effort expended in those stages when purchasing a transport service or good (Van Winter 2007). For example, in the routine re-ordering process, a freight forwarding company that is purchasing a Twenty-foot Equivalent Unit (20' TEU) of space every month from an ocean carrier to the same destination is likely to not undertake each stage of the decision process. Alternatively, a freight forwarding company may slightly modify only some stages but not the entire process. However, a freight forwarding company that is purchasing 20' TEU of space to a certain destination for the first time is likely to be involved in each stage of the decision process before making a decision for a carrier.

The Buy-grid framework has been widely applied in scientific research, including in transport logistics research (Andresen, Hollensen & Kahle 2013; Campbell 1985; Cook 1967; Cunningham, MT & Kettlewood 1976; Lillie & Sparks 1993). Similarly, in the field of ocean carrier selection a significant number of studies have applied the buy-grid framework, (Brooks 1983, 1984, 1995; D'este & Meyrick 1989; Gailus & Jahn 2015; Şakar 2012; Van Winter 2007).

Freight forwarders and shippers work through a list of criteria before deciding on which carrier to use when purchasing transport freight services (Fanam, Nguyen & Cahoon 2015; Maheshika & Abeysekara 2015). The list of criteria essential to transport service buying organisations for this purpose can be classified into four major dimensions as following:

- Risk reduction: that is, the tendency of transport service buyers to reduce perceived risk. Freight service buyers employ every measure to avoid any risk that may be associated with the service that they are purchasing, especially regarding service reliability, transit time

reliability, frequency of sailing, service provider reputation and damage rate by the carrier (Davies & Gunton 1983; Shin 2015).

- Price: that is, price flexibility and lower freight by carriers, in that the carrier is flexible to negotiate rates or offer credit facilities and net billing to the freight forwarders (Banomyong & Supatn 2011).
- Ease of use: the carrier's ability to know about a freight forwarder's operations and the degree of possible integration with the forwarder's schedule may be significant in the forwarder's selection of carrier (Fanam, Nguyen & Cahoon 2016; Lillie & Sparks 1993).
- Company image: the company image regarding the courtesy of carrier staff and duty of care to freight forwarders (Huang & Hsu 2016; Lirn & Wong 2013).

Brooks (1983) applied the buy-grid model to develop a model for the ocean container carrier selection process. Brooks' model condenses the carrier selection model into a three stage process. The first stage involves shipper/freight forwarder recognition of the need for carrier choice, (Brooks' study analysed the views of both cargo owners and freight forwarders and hence the term shipper is used here to denote cargo owners and freight forwarders). Stage two covers the list of carriers developed by a shipper, and then the shipper's search for a carrier service available between the origin and named destination analysed based on constraints. The third stage involves a shipper's decision to choose a carrier based on their selection factors developed at stage one. The cargo owner/freight forwarder undergoes a complex decision-making process before deciding on which carrier to use, because freight service buyers are not homogeneous in their transport service needs (Brooks 1995).

3.2.2 THE BUYING PROCESS OF FREIGHT FORWARDERS

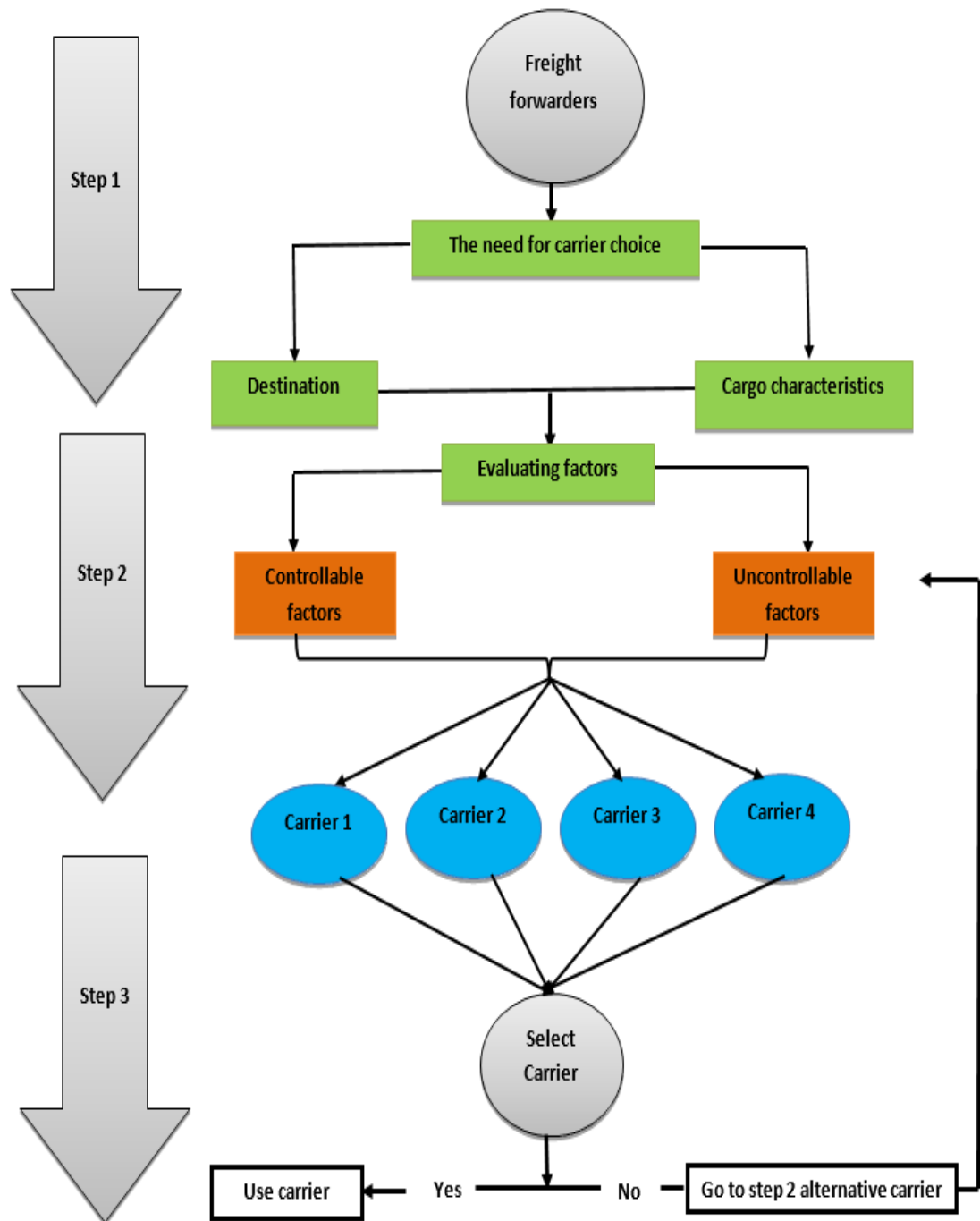
Freight forwarders who act as sole decision makers regarding choice of carrier, must endeavour to choose the 'best' carrier in their agency capacity so as to benefit their clients. The decision making of a freight forwarder on which carrier to use can be complex, depending on which phase of the buying process a freight forwarder is making the decision. That is, either buying a transport service for the first time from a new carrier, or buying a

new service from an existing carrier that the freight forwarder has used frequently. Freight forwarders gather information, and assess and process this before making a decision to choose a suitable carrier.

Freight transport service buyers are continually making choices among products, the consequences of which they are but dimly aware (Nelson 1970), just as freight forwarders are continuously choosing among various carriers. Prior knowledge of a freight forwarder about a carrier is crucial for them to make a suitable decision. A consumer's prior knowledge and experience with a product plays a significant role in the decision-making process (Bettman & Park 1980). Hence, the freight forwarder's knowledge and experiences about the transportation of cargo might influence their decision making.

Prior knowledge about ocean carriers is important to freight forwarders. For example, at the pre-purchase choice stage, the freight forwarders consider all relative activities happening before the purchasing of a service from shipping lines. At this stage, when a freight forwarder signs a contract with a cargo owner to transport his/her cargo from one point of origin to another point of destination, a freight forwarder considers the options of which type of modes are available and which are suitable for moving such cargo. In this case, a freight forwarder considers cargo characteristics before deciding on a particular mode to use. The freight forwarder then vigorously examines their transportation needs and collects information regarding possible alternative vessels (Plomaritou, Plomaritou & Giziakis 2011). Information collected on carriers is blended with the freight forwarders prior knowledge about the carriers before arriving at a decision on which carrier to choose.

The process of carrier choice decision included in Figure 3.1 is based on the suggestion by Brooks (1983), Brooks (1990), Van Winter (2007), Brooks et al. (2012) and Gailus and Jahn (2015) and including freight buying choice of freight forwarders discussed in literature review in Chapter 2. Figure 3.1 presents the buying process for freight forwarders' selection of ocean container carrier and includes three steps.

Figure 3.1: The Freight Forwarder Buying Decision Process

Source: Author

Step 1 involves the freight forwarder's recognition of the need for a carrier choice which is followed by their consideration of the cargo's characteristics

and its destination. He or she then makes a judgement about a suitable mode to use, and proceeds toward evaluation of the carriers on that specific mode.

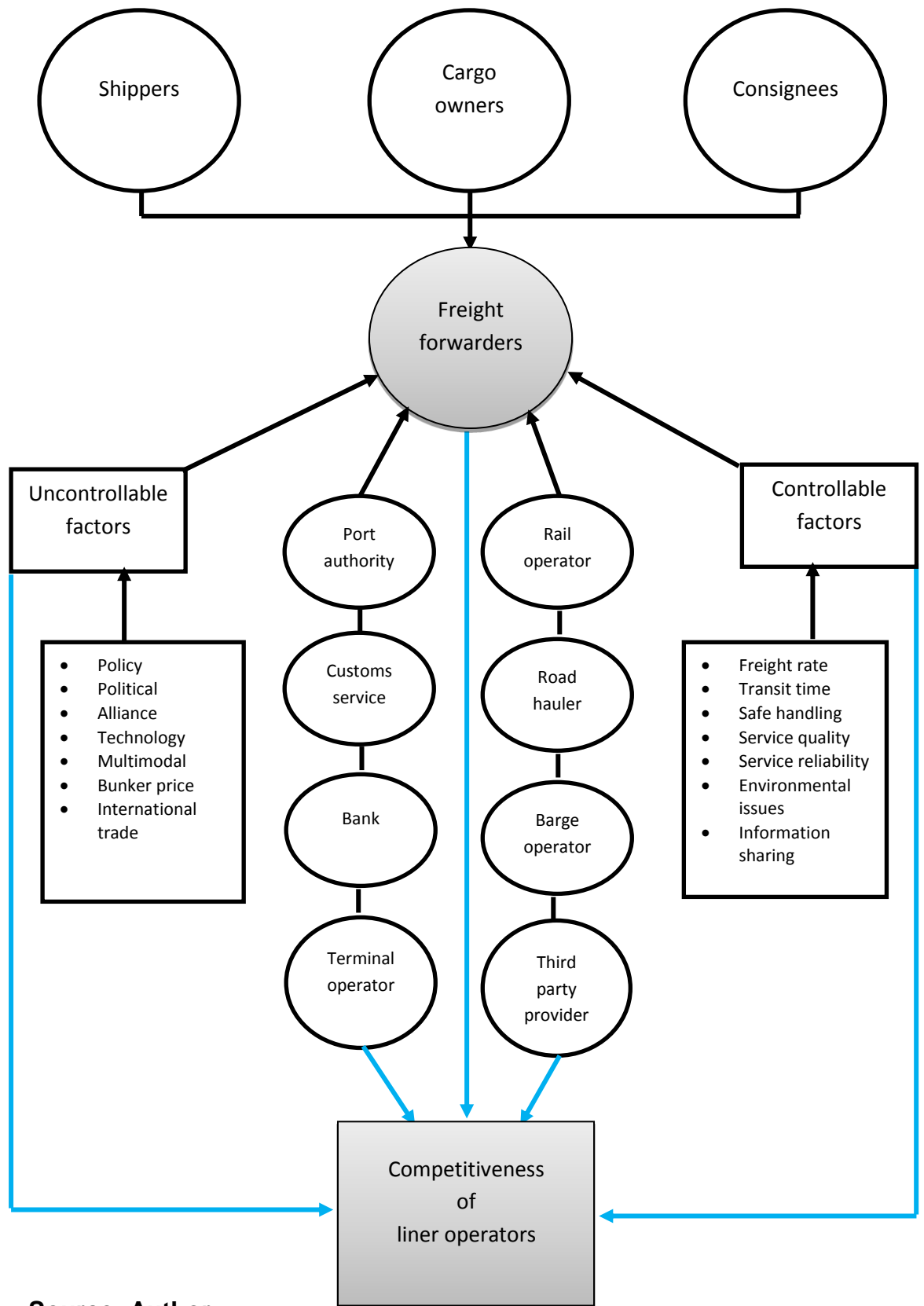
Step 2 constitutes the freight forwarder's evaluation of carriers. At this stage, freight forwarders extensively evaluate controllable factors and also take into consideration uncontrollable factors.

Step 3 is where they select a carrier based on the extensive evaluation of the preceding steps by comparing each carrier service available at their disposal to make sure which one best meets their requirements. A freight forwarder will proceed further to use a carrier upon it satisfying (YES) freight forwarder criteria. However, if a freight forwarder is not satisfied (NO), then he or she goes back to step 2 to examine the ocean carrier selection factors again. The purchasing of transport services by freight forwarders passes through the three fundamental steps outlined in Figure 3.1 before they choose a 'best carrier' for their freight transportation.

The conceptual framework discussed in the next section is based on the freight forwarder's decision making process through these three level phases shown in Figure 3.1.

3.3 CONCEPTUAL FRAMEWORK

This section proposes a conceptual framework for the present study that identifies key factors that influence the competitiveness of ocean container carriers from the perspective of freight forwarders. The conceptual framework was developed out of literature shown in Table 2.1 in Chapter 2 and the freight forwarders buying process outlined in Figure 3.1. The framework will help to analyse salient factors that freight forwarders consider when buying a transport service from ocean container carriers, and it will also help in the development of the survey instrument. The framework shows the relationship of all factors affecting ocean container carrier competitiveness from the viewpoint of freight forwarders. That is, the freight forwarder's perspective is influenced by both internal selection factors and external selection factors. The former can be controllable and uncontrollable factors from the freight

Figure 3.2: Conceptual Framework of the Research Context**Source: Author**

forwarder's point of view as illustrated in the conceptual framework presented in Figure 3.2. The framework notes the relationship between the freight forwarders and cargo owners, shippers, and consignees. To a certain degree, cargo owners, shippers, and consignees can influence the choice of the freight forwarders about which ocean container carrier to use. There are instances in which cargo owners can designate a specific carrier for the freight forwarders to deal with.

However, the current study focuses on the choice of an ocean container carrier from the freight forwarder's perspective where a freight forwarder is solely making a selection for an ocean container carrier without much influence from a cargo owner.

Previous studies, for example, Xu and Lai (2015) and Maloni, Gligor and Lagoudis (2016) have focused mainly on the selection of carriers from the shippers or cargo owner's perspective, which does not reflect the views of the actual decision-makers and the factors that influence their selection of ocean container carriers. Freight forwarders are the true decision makers about which ocean container carrier is used for transportation, because they offer cargo directly to a carrier on behalf of its owners (Flitsch & Jahn 2014).

Brooks (1990) noted in her study of ocean carrier choice in Canada that shippers themselves cited it being freight forwarders who make carrier selection decisions for them. Again in another study it was freight forwarders who consolidated cargo from various shippers into full container loads and provided it to ocean container carriers for transportation (Ding, Tseng & Hsu 2013).

The conceptual framework looks at the controllable factors which influence the competitiveness of ocean container carriers from the freight forwarder's perspective. The framework is concerned with the direct effect of the controllable influential factors on ocean carrier competitiveness judging from carrier shipping service performance. The framework reveals that there are two categories of factors, controllable and uncontrollable that influence the competitiveness of ocean container carriers. The framework also identifies

external factors, that is, the key actors involved in the container supply chain which may not influence the freight forwarder's decision. The external actors noted in Figure 3.2 such as port authorities, rail operators, customs services, road haulers, banks, barge operators, terminal operators and third party providers do not directly influence freight forwarder decisions regarding selection of carrier. However, they do have influence over liner carrier competitiveness in relation to how those carriers coordinate the activities of those actors within the container supply chain.

As shown in Figure 3.2, the key components in the carrier selection process are shippers, cargo owners, consignees, freight forwarders, other transport actors and liner shipping companies. Within the conceptual framework, the circles represent the transport actors while the boxes denote the factors and collective factor.

Firstly, the framework concerns the evaluation of carrier selection variables. At this stage, a freight forwarder evaluates their carrier selection variables and then condenses the variables into controllable or uncontrollable factors. The extant literature in the preceding chapter reveals various carrier selection variables discovered. In order to identify the controllable or uncontrollable factors influencing the freight forwarder's choice of ocean carriers, it is important to understand ocean carrier selection variables. Understanding these variables helps freight forwarders to formulate relevant controllable factors before choosing an ocean carrier.

For example, Brooks (1995) applied 16 carrier selection variables to explore the importance that freight forwarders and shippers attach to carrier selection factors when purchasing freight services from ocean container carriers on the North Atlantic route. Also, Tuna and Silan (2002) employed 24 selection variables to measure transport manager perceptions of choice of the ocean container carriers so as to understand the factors affecting the selection of ocean carriers in the Turkish maritime industry. The performance of ocean container carrier services were examined by Lu (2007) and Wen and Huang (2007) using 28 and 20 carrier selection variables respectively, to identify critical factors affecting the market share percentage controlled by liner

shipping companies within the Taiwanese maritime industry. Finally, Chung, Chung and Tai (2011) and Shang and Lu (2012) applied 20 and 21 selection variables respectively to analyse the key factors impacting the level of efficiency of ocean container carriers from the perspective of freight forwarders in the Taiwanese liner shipping industry.

Secondly, the conceptual framework aims to identify key factors influencing the competitiveness of ocean container carriers from the freight forwarders' perspective. At this level, freight forwarders use controllable and uncontrollable factors to make a decision about choosing the 'best' carrier. They use controllable factors to assess the suitability of a carrier because the controllable factors are the factors that ocean container carriers have total control over. Thus, the freight forwarders critically analyse how ocean carriers respond to controllable factors by offering services that address the issues in regards to them.

For example, a freight forwarder may choose an ocean carrier who offers a short transit time between certain predetermined ports of origin and destination. In order to condense the carrier selection variables into selection factors, researchers have used statistical methods to reduce the carrier selection variables into influential factors (smaller number factors). However, the present study aims to use factor analysis in the subsequent chapter to reduce the selection variables into influential factors.

Thirdly, the framework shows the relationship between the key parties that are involved in the decision-making process of freight forwarders and their perceptions of ocean carrier competitiveness. Freight forwarders measure the competitiveness of the ocean container carrier base on how the ocean carriers coordinate with other parties within the container supply chain. The liner shipping company's coordination of container flow through the logistics chain, by liaising with the port authority, terminal operator, rail operator, road haulier, barge operator, third party provider, customs and the banks has a significant influence on the smooth flow of containers through the container supply chain. Therefore, the effective coordination of container movement among the transport players is paramount.

Fourthly, the other parties within the container supply chain also have a direct influence on the competitiveness of ocean container carriers. Every transport player within the container supply chain has various purposes to fulfil within the chain. External parties view the competitiveness of ocean container carriers based on their ability to respond to each party's needs within the container supply chain.

Finally, freight forwarders make a decision about choosing an ocean container carrier by assessing how they respond to indicators within the conceptual framework. The indicators which mainly influence the freight forwarder's choice of ocean carriers are the controllable factors. Thus, the present study focuses on identifying the most influential controllable factors. This study concentrates on controllable factors because these are the ones that ocean carriers can deploy their resources to address, unlike uncontrollable factors and external factors which are not within their immediate control. Freight forwarders measures the competitiveness of ocean container carriers based on their overall service performance. The percentage of market share that an ocean container carrier controls, that is, the number of freight forwarders using it can be used to measure its true competitiveness. Thus, the factors that freight forwarders employ when choosing such carriers is essential to uncover.

A comprehensive discussion on the literature concerning carrier selection factors was given in Chapter 2. This chapter however focuses on the development of the conceptual model. The conceptual model presented in Figure 3.2 has shown the controllable, uncontrollable and external notions of the framework, starting from the identification of carrier selection variables, followed by the condensing of selection variables into controllable and uncontrollable factors, and the selection of carriers based on influential factors. Finally it shows how those influential factors impact the competitiveness of liner operators.

3.3.1 CONTROLLABLE FACTORS

This section concerns the controllable factors that influence the choice of ocean carriers by freight transport service buyers. In order to derive the

controllable factors, researchers have used various statistical methods to determine factors that influence the choices of ocean carriers made by freight forwarders and shippers. Controllable factors are those that ocean carriers have the resources and capabilities to improve within their domain. A carrier's ability to provide services that customers need is able to attract people to purchase such services. To arrive at the determinant factors influencing the selections of carriers, researchers such as Hu and Jen (2010); Premeaux (2010); (Banomyong & Supatn 2011); Shang and Lu (2012); Yang (2012a) and Van den Berg, Roy and De Langen (2014a) have employed factor analysis to identify the most influential factors that affect carrier choice. Others have applied an analytic hierarchy process to determine critical factors that influence ocean carrier selection (Kannan, Bose & Kannan 2011; Lam & Zhang 2014; Lirn & Wong 2013; Wong, Yan & Bamford 2008).

Table 3.2 summarises the carrier selection variables from the preceding chapter. It divides them into major factors and provides further theoretical support for the model's propositions by showing the relationships among the factor constructs. As mentioned earlier the influential factors affecting the choice of ocean container carrier are developed out of these selection variables. Critical factors emerge out of these ocean carrier selection variables are those observed by previous studies, as shown in Table 3.2.

Mangan, Lalwani and Gardner (2002) assessed the service efficiency of the ocean RoRo carrier in Ireland/UK and Ireland/Continental European markets, where factor analysis was applied to reduce 15 carrier selection variables to three important factors which affect the service level of ocean carriers.

Wen and Huang (2007) investigated the perceived satisfaction levels of freight forwarders on service attributes of ocean container carriers as well as their selection behaviour. The authors employed factor analysis to condense the 20 carrier selection attributes to three critical factors, namely speed/

Table 3.2: Summary of Carrier Selection Variables and their Underlying Factors

Factors	Variables	Authors																			
		Matear and Gray (1993)	Brooks (1995)	Lu (2003)	Dobie (2005)	Wen and Huang (2007)	Lu (2007)	Wong, Yan and Bamford (2008)	Tongzon (2009)	Premeaux (2010)	Kannan, Bose and Kannan (2011)	Premeaux (2011)	Banomyong and Supatn (2011)	Brooks et al. (2012)	Wang and Meng (2012)	Gailus and Jahn (2013)	Lirn and Wong (2013)	Lin and Yeh (2013)	Van den Berg and De Langen (2014)	Zhang and Lam (2014)	Ding et al. (2016)
Freight rate	Transparency of freight rates	x																			
	Simplicity of freight rates																x				
	Competitive freight rates													x							x
	On time quoting of rates													x	x						x
Transit time	Service schedule reliability						x						x	x		x			x		x
	Frequency of calls												x	x		x				x	
	Reliability of transit times										x					x		x			
	Direct sailing														x			x		x	x
	Geographical coverage							x					x								
Safe handling of cargo	Quality of cargo handling facilities												x			x	x				x
	Ability of door-to-door services																		x		x
	Cargo's safety management				x	X							x								
	Dedicated berth by shipping line								x											x	
	Ability to obtain berth on arrival								x											x	
Service quality	Professionalism of carrier staff		x	x		x	x						x								x
	Ability of carrier staff to problem-solve					x										x					x
	Container detention free period					x					x										
	On time release of shipping documents	x						x			x										x
	Prompt response to customer complaints		x	x			x														
	Staff politeness and courtesy to client						x			x	x	x	x								x
	Shipping company reputation					x		x									x				



	Ability to coordinate other actors																	x	x		
	Carrier staff knowledge								x		x	x									x
	Corporate social responsibility by shipping line									x					x				x		
Service reliability	On time pick-up			x					x	x			x	x		x					
	On time delivery			x					x				x	x		x					
	On time invoicing		x								x	x			x						
	On time submission of cargo manifest		x		x			x												x	x
	Shipping line provision of emergency services						x								x	x					
	Shipping line's ability to provide late hours service						x			x		x					x				
Environmental issues	Carrier using renewable energy														x				x		
	Environmentally friendly operations by shipping line																		x	x	x
	Carriers committed to reducing CO2 emissions													x							
Information sharing	On-time notice on arrival and departure information								x	x	x										x
	Cargo tracking				x							x				x			x		x
	On time issuing of B/L					x	x														
	Availability of online booking			x		x	x				x		x								

reliability, safety/empathy and convenience. Again, Van den Berg, Roy and De Langen (2014a) applied factor analysis to assess the value propositions of shipping by reducing a large number of selection variables into key factors. The literature review in Chapter 2 revealed that carrier selection factors are rarely made independently; they are interdependent or interrelated and are often internalised in the overall choice of liner operator competitiveness. In the next section, this study looks at uncontrollable factors that affect the competitiveness of liner shipping companies.

3.3.2 UNCONTROLLABLE FACTORS

Despite significant influence by controllable factors on the competitiveness of ocean container carriers, there are also uncontrollable factors which impact on their competitiveness. These are factors that the shipping companies do not have power over. They are typically taken as given or under the control of other parties outside the container supply chain. They can be those associated with policy, politics, alliances, technology, multimodal, bunker price and international trade (Lebbadi 2015; Mander 2016).

Ocean container carriers are heavily impacted on by national and international policies shaping the scope and operations of liner shipping companies. Maritime policy is a significant issue influencing their competitiveness. Particularly, policies on safety, security, and environmental issues are pressing issues dominating international trade, and likewise, liner shipping over recent years. Thus, these exert pressure on shipping companies concerning how to operate at international standards while minimising operation costs (Lun, Lai & Cheng 2013; Panayides & Song 2013). Government policies have a significant impact on maritime transport with severe cost implications for liner shipping companies (Fink, Mattoo & Neagu 2002). The compliance of maritime environmental policies has a significant influence on the operational performance of liner shipping companies (Lee Chang & Lee 2013). A shipping company which complies with new policies emanating from international and governmental bodies will remain more competitive from the freight forwarder's perspective than a

shipping company which is not complying. For example, liner shipping companies are gravitating towards greener energy with sophisticated technology now pushing them to meet policy needs while also remaining competitive.

Bilateral trade and multilateral agreements within international trade are also influencing liner shipping market share. Political influences from local governments are increasingly having an impact on their market share. Political influence has also been identified as the most significant risk affecting their market operations as well (Ding, Tseng & Hsu 2013). Governments engage in bilateral agreements which indirectly affect liner shipping companies operating within that sector through discriminatory treatment within the particular geographical trading zone. The companies do not have control over these trade agreements signed among countries. Thus the liner shipping sector is in a constant state of flux with economic development in recent years leading to growing international competitive pressure from competitors around the globe (Gao & Yoshida 2013).

In the 1990s, the formation and membership of strategic alliances were a dominant feature in the liner shipping industry, and this has grown even more prominent in recent times as the global financial crisis intensified (Panayides & Cullinane 2002; Panayides & Song 2013). Liner shipping companies are forming alliances and mergers in order to enhance their competitiveness in the depressed shipping sector where there has been excess capacity in times of recession and irregular runs of cash flows (Gao & Yoshida 2013; Papa 2013). The formation of modern alliances among companies was born out of reasons such as risk and investment sharing, the reaping of economies of scale, cost-control, the capability to increase service frequency, fleet deployment, schedule design and improvement of competitiveness (Meng et al. 2013; Panayides & Cullinane 2002). Liner shipping companies however do not have control over which shipping companies form alliances within a particular route.

The world's container liner shipping fleet continues to increase in size as technology has taken the centre stage on issues of capacity expansion and growth of ship size, causing deployment of a range of new equipment to be developed, which includes automated engines and cargo control systems (Bhardwaj 2013). The innovation infused into liner shipping through information technology has increased in sophistication, quickening the pace of decision making. Technology continues to improve loading and offloading, speed of delivery, transit time, safety of cargo handling and seamless integration between modes (Taudal Poulsen 2007). Technological changes and innovation capability within the liner shipping sector has caused some liner shipping companies to be more competitive than others within the same market. Liner shipping companies however do not have control over the new technologies that competitors are using to gain a competitive edge. Technology is the driver of ship enlargement as liner shipping companies seek economies of scale which has further lead to an oversupply of vessel capacity (Bernhofen, El-Sahli & Kneller 2016).

Maritime transport security exerts enormous pressure on the competitiveness of liner shipping companies regarding cost and service delivery. Any interruption within the maritime transport chain due to international hostile actions greatly affects container supply chain flow and the global economy at large. Maritime transport contains a high level of vulnerability to terrorist attacks, given the extremely limited number of routes it uses and the enormous volume and wide range of shipped goods whose origin, description, and ownership are not always perfectly traceable (Papa 2013; Szyliowicz & Zamparini 2014). Maritime security poses cost implications for shipping companies as carriers are constantly striving to minimise risk associated with maritime transport. Liner shipping companies do not have total control over the risks associated with maritime transport. Even though, liner operators do not have the control over the above mentioned uncontrollable factors, these factors affect their competitiveness from the perspective of freight forwarders.

3.4 SUMMARY

The conceptual framework presented in this chapter has provided a foundation for testable hypotheses that are concerned specifically with research question two; that is, 'In what ways do freight forwarders' carrier selection considerations and practices impact the competitiveness of liner carriers on a particular route.' The purpose of this conceptual framework is to identify influential factors which affect the competitiveness of liner shipping companies. The framework first looked at carrier selection variables perceived by freight forwarders. It further condensed selection variables into major carrier selection factors. Influential factors were derived based on the factors that freight forwarders consider important, depending on the amount of significance that they attached to each one. The framework shows that freight forwarders perceive controllable factors as highly influential in their decision making for ocean carrier selection. However, the framework also noted uncontrollable factors and external (actors) factors which have some level of effect on the competitiveness of ocean container carriers from the freight forwarder's perspective. In addition, the framework indicated that other transport parties within the container supply chain have a direct impact on the competitiveness of liner shipping companies.

The buying behaviour of freight forwarders has been discussed in this chapter since ocean carrier selection depends on an understanding of freight forwarder buying behaviour. The buying behaviour of freight forwarders has a direct effect on which selection variables they use in choosing a carrier. The discussion of carrier selection variables is important for this framework because the subsequent analyses are based on the understanding of these carrier selection variables. Thus, this chapter has discussed the relevant issues regarding carrier selection variables and the condensing of these into key factors.

The conceptual framework has provided a foundation for exploring which influential factors affect the competitiveness of ocean container carriers. The key themes analysed in this chapter are the buying behaviour of freight

forwarders, carrier selection variables, controllable and uncontrollable factors, transport players and liner operator competitiveness.

The next chapter will discuss the survey design, research questions and the hypothesis in relation to research question two. The survey instrument designed in the next chapter is based on carrier selection variables identified in the conceptual framework. The perception of freight forwarders is a fundamental element for the design of an effective strategy for identifying the key factors affecting the selection of ocean carriers. It is the freight forwarders who provide reliable information on the interrelating factors that impact the choice of ocean carriers in the liner shipping sector.

The conceptual framework of this research has presented freight forwarders' perceptions about the key factors influencing selection of ocean carriers. The key factors that emerge out of the selection variables perceived by them is paramount for ocean carriers to formulate relevant marketing strategies. Thus, the research questionnaire in the next chapter is constructed according to this conceptual framework. With this in mind, further empirical investigation has been planned and reflected on in the research methodology. The following chapter presents the methodology of this research.

CHAPTER FOUR

RESEARCH METHODOLOGY

CHAPTER 4 RESEARCH METHODOLOGY

4.1 INTRODUCTION

As explained in Chapter 1, this study explores the competitiveness of liner operators by considering the factors that freight forwarders consider important when choosing ocean container carriers. In doing so, it also uncovers challenges that freight forwarders face when selecting the 'best' ocean container carrier to transport their client's cargo. Understanding these factors, for example as perceived by freight forwarders, can help liner shipping companies formulate relevant marketing strategies to attract and retain freight forwarders for their liner services. Past studies have analysed ocean carrier selection factors from the shipper's perspective (Ben-Akiva, Bolduc & Park 2013; Tuna 2001; Yang, Tai & Chiu 2014; Zsidisin, Voss & Schlosser 2007). However, little work has been done from the perspective of freight forwarders. The current study therefore considers undertaking empirical study in this area.

Consideration of research methodology is an important and essential element in the research process, as a research outcome largely depends on whether an appropriate methodology has been employed by the researcher. Scandura and Williams (2000) assert that for management research to progress it is important that the researchers assess the methods that employ, because the impact of their study depends upon the appropriateness and rigour of the research methods chosen. This chapter explains an appropriate research methodology to achieve the research objectives stated earlier in Chapter 1.

More specifically, this chapter investigates the research design and analytical methods including how information is collected from freight forwarders about their views and opinions on liner shipping companies, which will then be used to analyse their choice of carrier. A structured questionnaire survey (a survey of freight forwarders) is used as the data collection instrument to assist in the analysis of the current knowledge and experiences of freight forwarders.

The rest of this chapter is organised as follows: Section 4.2 explains the research design of this study; Section 4.3 explains the Ghanaian liner shipping industry based on its contribution to economic development, its container market development, its transport infrastructure and its freight forwarding industry. Section 4.4 presents the survey design, the development of the survey questionnaire and the data collection techniques used. Section 4.5 explains the data analysis techniques and error control measures used, and Section 4.6 presents the summary and conclusions of the chapter.

4.2 RESEARCH PHILOSOPHY AND APPROACH

A research philosophy is the belief about how data about a particular phenomenon should be collected, analysed, and then used, or the paradigms and assumptions that guide the development of knowledge in a particular field of research (Creswell 2013; Saunders, Lewis & Thornhill 2011). The choice of research philosophy is important because it shows how a researcher perceives the world, and it shapes how the researcher chooses a research strategy and methodology for their area of investigation (Saunders et al. 2009).

According to Creswell (2013), there are four schools of thought in the field of research paradigms. These are post-positivism, constructivism, advocacy/participatory, and pragmatism. However, scientific theory has condensed these into two paradigms and conducted research mainly from these two paradigms: the perspectives of positivism and social constructionism (Easterby-Smith, Thorpe & Jackson 2012). Positivism is sometimes referred to as quantitative research and social constructionism as qualitative research (Creswell 2013). The role of the researcher in positivism studies is limited to data collection and interpretation through an objective approach, and the researcher's findings are usually observable and quantifiable.

In general, qualitative researchers study phenomena in their natural settings, attempting to make sense of or interpret phenomena regarding meanings

that people bring to them (Denzin & Lincoln 2011). The qualitative research approach also seeks insights and understanding of people's perceptions of the world through a collection of unstructured data that can generate non-quantifiable results (Easterby-Smith, Thorpe & Jackson 2012).

Quantitative research is defined by Muijs (2010) as the process of explaining phenomena by collecting numerical data that is analysed using mathematically based methods (in particular statistics). Quantitative research method questionnaires are usually shorter and more specific, and mainly focus on the elements that contain the greatest amount of information for explaining the behaviour of the researcher's subjects (Muijs 2010). Quantitative methods to a certain degree can be referred to as an extreme form of empiricism, according to which theories are not only to be justified by the extent to which they can be verified, but also by an application to facts acquired (Amaratunga et al. 2002). In quantitative research, the "researcher seeks explanations and predictions that will generalise to other persons and places and careful sampling strategies, and experimental designs are aspects of quantitative methods that produce generalised results" (Thomas 2003 p. 2).

According to Amaratunga et al. (2002) each research strategy has its own specific approach to collect and analyse empirical data. Therefore, each strategy has its advantages and disadvantages. In order to establish which method is more suitable for a study, it is necessary to distinguish between these methods. Figure 4.1 provides an overview of the features of both the qualitative and quantitative methods.

The current study relies considerably on the operational views and processes of freight forwarders. It will therefore employ a quantitative approach, since it takes a robust look at the phenomenon from the outside, and it reduces the phenomenon to the simplest elements that can be formulated into a hypothesis and tested. Also, the study hopes to produce an operational concept that can be measured.

Figure 4.1: Claimed Features of Quantitative and Qualitative Methods

Quantitative	Qualitative
Quantitative makes inquiry from the outside	Qualitative makes inquiry from the inside
Underpinned by a completely different set of epistemological foundations from those in qualitative research	An attempt to take account of differences between people
Are simply different ways to the same end	Aimed at flexibility and lack of structure, in order to allow theory and concepts to proceed in tandem
Involves following various states of scientific research process	The results are said to be, “deep, rich and meaningful” through theoretical generalisation
The results are said to be “hard generalizable data”	Inductive – where propositions may develop not only from practice, or literature review, but also from ideas themselves
	An approach to the study of the social world, which seeks to describe and analyse the culture and behaviour of humans and their groups from the point of view of those being studied

Source: Adapted from Amaratunga et al. (2002 p.20)

The quantitative method has been widely used by researchers in transport and logistics studies to identify factors that influence the choice of carrier as perceived by freight forwarders (Banomyong & Supatn 2011; Cavalcante & Roorda 2013; Chung, Chung & Tai 2011; Premeaux 2011; Saeed 2009; Van den Berg, Roy & De Langen 2014a; Wen & Huang 2007). Other studies have analysed freight forwarder choice of sea ports by applying a quantitative method (see for example Gotzamani, Longinidis & Vouzas 2010; Park & Min 2011; Saeed & Aaby 2013).

Table 4.1 outlines previous studies that have applied the quantitative method in the field of transport logistics management to analyse the view of shippers and freight forwarders concerning carrier selection.

Table 4.1: Transport Logistics Management Research Method

Literature	Objectives	Perspective	Method
(Lu 2007)	Evaluation of key resources and the capabilities of liner shipping	Identifying the key influential factors in liner shipping	quantitative
(Zsidisin, Voss & Schlosser 2007)	Improvement of transportation performance through the shipper and carrier relationship	Transportation choice – decision	quantitative
(Brooks & Trifts 2008)	Exploring significant factors that shippers adopt when selecting transport mode	Understanding shippers' transport mode selection	quantitative
(Kuster 2008)	Risk reduction through simulation	Simulation of the decision-making process	quantitative
(Wong, Yan & Bamford 2008)	Efficient integration of logistics models into international cargo shipping	Identification of significant parameters in carrier selection using AHP	quantitative
(Banomyong & Supatn 2011)	Enhancing the efficiency of the international logistic channel through a selection of “best” logistics service providers	Identifying factors that affect the decision making of logistic providers	quantitative
(Premeaux 2011)	Perceived importance of carrier selection factors to both shipper and carriers	Carrier choice selection factors	quantitative
(Rajesh et al. 2011)	Logistics providers observed factors	Logistics service providers relationships	quantitative
(Singer & Donoso 2011)	Analysis of contractors in the value chain	Transportation contractors choice	quantitative
(Wang & Meng 2012b)	Enhancing ship transit time reliability and decreasing bunker consumption	Liner ship route schedule design	quantitative
(Lirn & Wong)	Understanding the behaviour of	Analysis of transport	quantitative

2013)	freight transport buyers	choice behaviour	
(Maloni, Paul & Gligor 2013)	Improving fuel efficiency and lowering greenhouse emissions through simulation	Simulation of the decision-making process	quantitative

In applying a quantitative method to this research, perceptions of freight forwarders shall be investigated concerning factors that they consider most influential when choosing ocean carriers, and how this impacts the competitiveness of liner shipping companies and the volume of cargo attracted by them. Quantitative method enable researcher to translate concepts into measurable factors and allow researcher to provide summaries of data that support generalisations about the phenomenon under study.

The quantitative method is largely applied in carrier selection studies and transport logistics studies, and the quantitative method is considered an appropriate and robust method for analysing freight forwarder and shipper perceptions concerning important factors influencing their decisions on modes and carrier choice (Chung, Chung & Tai 2011; Crum & Allen 1997; Lu 2003a; Murphy & Daley 2000; Rajesh et al. 2011; Saeed 2013; Şakar 2012; Wang & Meng 2012b).

4.2.1 JUSTIFICATION OF THE QUANTITATIVE METHOD

Previous studies focusing on carrier and mode selection have often relied on quantitative method to analyse the influential factors affecting shippers and freight forwarders choice (Chao & Chen 2014; Kim 2014; Reis 2014). Researchers have largely applied the quantitative method to the field of transport logistics for various reasons. This study however has adopted it for the following of its strengths:

Firstly, comparison and replication are allowable in quantitative method that is researcher can compare results of studies over time (Bryman & Bell 2015). Secondly, it enables the independence of researchers from the subject being observed, and allows a researcher to distance him or herself from the object

to prevent personal influence over the outcome (Kruger 2003). Thirdly, the subject under analysis is measured through objective methods rather than being inferred subjectively through sensation (Amaratunga et al. 2002). Fourth, the researcher's reflection or intuition, and reliability and validity of results may be determined more objectively than with qualitative techniques (McNabb 2015). Fifth, quantitative method is strong in measuring descriptive aspects and it emphasises the need to formulate a hypothesis for subsequent verification (Easterby-Smith, Thorpe & Jackson 2012). Sixth, it helps to search for causal explanations in addition to fundamental laws, and it reduces the whole to the simplest possible elements in order to facilitate analysis (Easterby-Smith, Thorpe & Jackson 2012). Finally, the quantitative method allows large-scale data collection and analysis at a reasonable cost and by a reasonable level of effort, as well as providing statistical "proof". It may also permit generalisation of results to the broader population (Amaratunga et al. 2002).

Freight forwarders are often busy working extra hours, and will often not make themselves available within their working hours for an interview. Hence, the quantitative method is appropriate for exploring the views of forwarders within the scope of their available time (Şakar 2012). Sakar (2012) further noted that freight forwarders are relatively small organisations, and are certainly rarely large enough to have public relations departments. They have multi-branch freight forwarding offices, with many of them being just small firms which are simply too busy and just trying to survive. Therefore, they may not make themselves available for interviews (Bird & Bland 1988; Şakar 2012). The quantitative method gives the freight forwarder an opportunity to answer the questionnaire at their convenience.

4.2.2 RESEARCH DESIGN

A research design is a logical plan for getting from here to there, where here may be designed as the initial set of questions to be answered and there is some set of conclusion (answers) to these questions (Yin 2014). The design provides planning for the process of collecting and analysing associations

between factors, which can then provide meaningful relationships and integration between variables according to the research objectives (Adams, Khan & Raeside 2014; Hopkins 2008; Jaržemskiene 2009; Yu & Cooper 1983; Zikmund et al. 2013). Choosing the most appropriate research methodology for a study will help explain and answer research questions which can thereby fulfil the objectives of the study (Cunningham 2014).

It is therefore, up to a researcher to decide on which strategy to employ within the choice of methods, so as to provide a specific direction for the procedures in the research design (Creswell 2013; Saunders, Lewis & Thornhill 2011). As such, the strategy of enquiry or the approach to the enquiry is determined mainly by the philosophical and epistemological positions adopted by the researcher in the study. The type of research strategy employed is based on the research questions and objectives, the researcher's existing knowledge of the study, the amount of time given to it, and other resources that are available for it, and lastly, it is based on the research philosophy of the researcher (Saunders, Lewis & Thornhill 2011; Zikmund et al. 2013). The overall research design of this study is to find answers to the research questions previously described (Saunders, Lewis & Thornhill 2011).

There are several research strategies employed by researchers including a case study, grounded theory, action research, ethnography, survey, archival research and experiments (Saunders, Lewis & Thornhill 2011). This study opts to use a survey because survey allow researcher to collect large data within short period of time at low cost. The reasons for choosing survey are further discussed in section 4.4.12.

The research design in this study is constructed to derive the best knowledge and experiences of the respondents concerning how they choose ocean carriers. This enables the researcher to develop a model to respond to carrier selection issues. An outcome could be shipping companies being more able to focus their resources in the right direction and formulate relevant

marketing strategies based on such knowledge. The proposed models will be tested in Chapter 5, and interpreted in Chapter 6.

As mentioned earlier in Chapter 2, there is a lack of information and empirical research into the existing knowledge about factors perceived as influential by freight forwarders when they select ocean carriers. Only a few existing researchers have discussed ocean carrier selection factors from the point of view of freight forwarders (see for example Van den Berg, Roy & De Langen 2014a; Wen & Huang 2007; Yang, 2012a). Even though these studies have investigated carrier selection factors from a freight forwarder's perspective, these studies end up surveying the views of freight forwarders and cargo owners. Therefore, they do not represent the actual views of freight forwarders alone. This therefore necessitates further empirical investigation into the competitiveness of ocean container carriers from the perspective of freight forwarders. Thus, this present study seeks to analyse the views of freight forwarders alone in order to reflect their actual views. This can be achieved by focusing on the research questions (PRQ) and the research hypothesis as follows:

PRQ1: What are the key considerations for freight forwarders in their selection of liner carriers?

Considering the important role of freight forwarders in maritime logistics operations, and how they help shipping companies to secure cargo volumes (Chung, Chung & Tai 2011), their choice of carrier has significant implications for liner shipping companies with regards to carrier revenue maximisation. The amount of cargo that a carrier is able to carry on each voyage depends on the cargo volume that freight forwarders are able to offer to a particular carrier. As a representative of the shipper, the selection of carrier may affect the shipping line's market share with regards to the amount of cargo volume it can attract and carry per voyage, which shows that freight forwarders may affect the revenue of a carrier. Thus, carriers understanding of the key considerations of freight forwarders when making carrier selection decision is

important for the liner carriers in order to fulfil those considerations to attract freight forwarders in purchasing their liner shipping service.

PRQ2: In what ways do freight forwarders' carrier selection considerations and practices impact the competitiveness of liner carriers on a particular route?

The major debate concerning the most influential factors affecting the selection of ocean container carriers has focused on cost and service related issues (Gouvernal & Slack 2012; Saldanha et al. 2009; Van den Berg, Roy & De Langen 2014a). The level of knowledge and experience acquired by freight forwarders in the freight forwarding industry has a significant impact on their level of decision making regarding carrier choice. It is therefore paramount to understand the degree of knowledge and experience possessed by freight forwarders in order to determine the competitiveness of liner operators, since it will inform the most influential factors considered by them when choosing an ocean carrier. Further understanding about how exactly they employ those factors when making ocean carrier decisions is also important. To help identify the level of influence of each factor on the competitiveness of liner shipping companies the following research hypotheses (RH) will be tested:

RH1: A liner operator's ability to offer higher service quality increases the competitiveness of that liner operator.

RH2: A liner operator's ability to offer highly accurate shipping documents increases the competitiveness of that liner operator.

RH3: A liner operator's ability to offer higher schedule reliability increases the competitiveness of that liner operator.

RH4: A liner operator's ability to offer higher flexible freight rates increases the competitiveness of that liner operator.

RH5: A liner operator's ability to offer quick handling increases the competitiveness of that liner operator.

RH6: A liner operator's ability to provide environmentally friendly operations increases the competitiveness of that liner operator.

It is anticipated that the statistical analysis of both exploratory factor analysis and confirmatory factor analysis (to be employed in chapter five and six) will confirm or disprove the respective hypotheses.

PRQ3: What are the issues facing freight forwarders in the selection of liner operators?

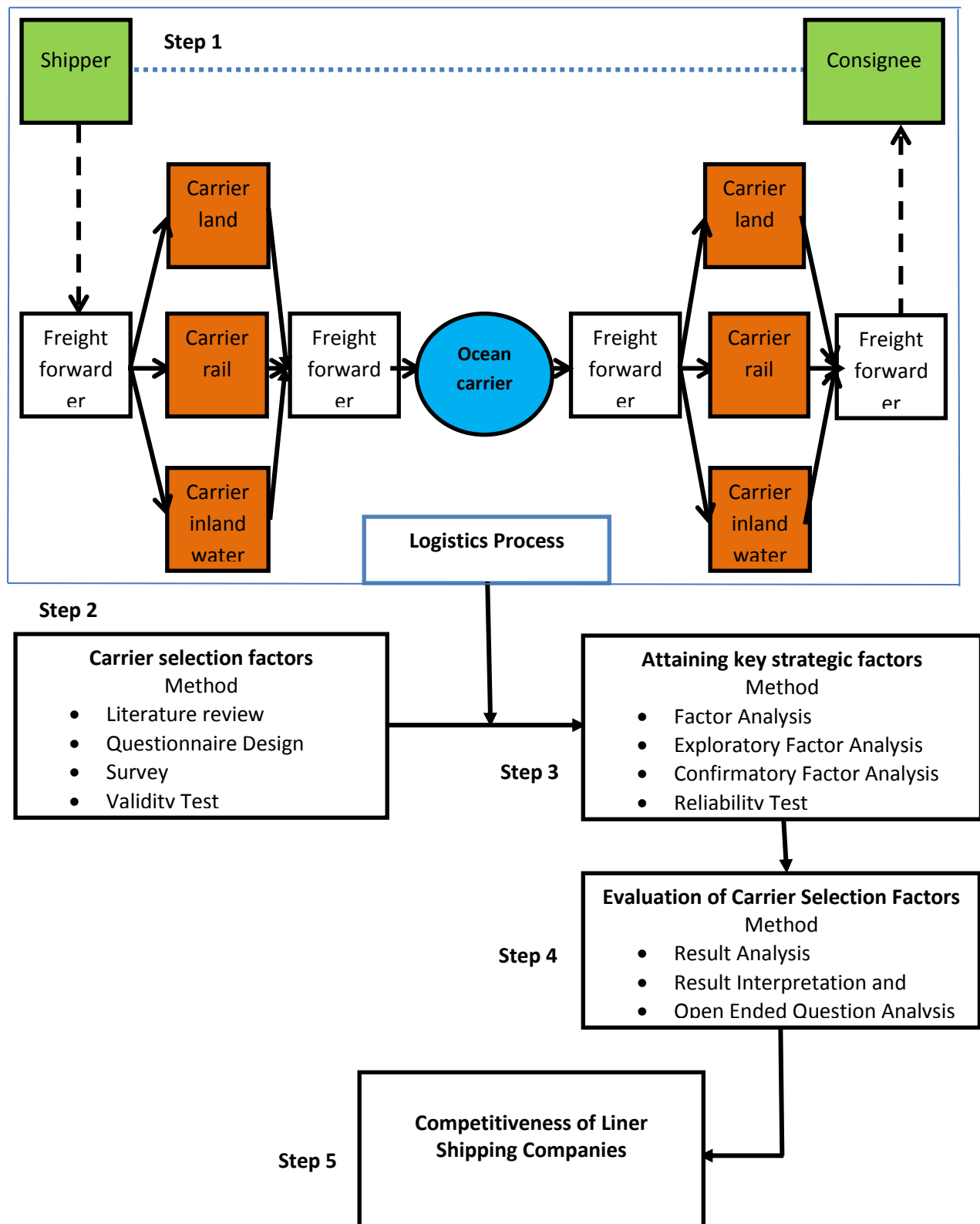
Challenges encountered by freight forwarders when choosing an ocean carrier have been discussed in the literature, but there has been no empirical analysis to identify the factors underpinning challenges faced by them.

Researchers have however, argued from various fronts on the need to understand the challenges facing them when choosing carriers (Kent & Parker 1999; Murphy & Daley 1995, 2001). The development of an appropriate pricing system is one of the challenges facing freight forwarders in transport logistics service. The ability of shipping companies to provide transparent freight rates to enable forwarders to compare and negotiate is practically impossible. There is no standard form of freight rate comparison or any database for freight rates where actual data could be obtained. Da Cruz, Ferreira and Azevedo (2013) pointed out that the simplicity of cost structure is one of the largest issues challenging ports and carrier choice competitiveness. The most confronting challenge for freight forwarders in carrier selection may be information sharing by liner shipping companies, especially regarding information on freight price structures.

This study relies on primary data obtained from an online survey conducted among freight forwarders in the Ghanaian maritime sector to assess the existing knowledge and experiences that utilised by them when making ocean carrier selection decisions.

4.2.3 THE ANALYTICAL PROCESS OF THE RESEARCH

The research process of this study is depicted in Figure 4.2, which outlines the five major steps through which answers to the research questions shall be provided. Step 1 shows the whole process of the logistics chain and

Figure 4.2: Analytical Steps

Source: Author

contractual framework relationships of parties within the container logistics chain, and how freight forwarders engage carriers into a contract of carriage on behalf of shippers. It further shows how freight forwarders interact with other carriers at various stages during the logistics chain process after signing an initial contract with the cargo owners.

At this point freight forwarders engage in two different contracts with carriers, first, the freight forwarders contract domestic or local carriers for domestic transport, and secondly, they contract international ocean container carriers for the international carriage of goods. The result of this step will provide insight on the role of freight forwarders in liner operator selection in maritime logistics operations.

Step 2 highlights the extant literature reviewed concerning carrier selection factors and which of these are considered important by previous researchers. The outcome of the literature review will lead to the development of the survey instrument to explore the views of freight forwarders.

In step three, the study shall analyse the key strategic statistical methods employed to identify critical factors that influence competitiveness of liner operators from the perspective of freight forwarders and which lead the research into answering PRQ1. Step four provides the interpretation of the results of these factors which lead the study into answering PRQ2 and the research hypothesis. Step four further analyses open ended questions into answering PRQ3.

In step five this study analyses how the factors influencing freight forwarder selection of carrier also influences the competitiveness of ocean container carriers with regards to their market share. The next section provides an overview of the liner shipping sector in Ghana and the contribution of liner sector into Ghana's economy.

4.3 THE GHANAIAN CONTAINER SHIPPING MARKET

As presented in Chapter 1, the current study aims to investigate the competitiveness of liner operators from the perspective of freight forwarders in Ghana. For that reason it is important to consider the characteristics of Ghana's economy and its container shipping sector as an important part of the environment in which its liner shipping operators, shippers and freight forwarders work. This section therefore presents background information on the Ghanaian economy and its container shipping sector, which will help provide justification for this study as well as inform the application of the conceptual framework developed in the previous chapter to the context of Ghana.

4.3.1 THE GHANAIAN ECONOMY AND TRADE

Ghana is located at the centre of the coast of the Gulf of Guinea, with a total area of 238,533 square kilometres a total land area of 227,533 square kilometres, and a water area of 11,000 square kilometres (Central Intelligence Agency 2016). Ghana's coastline is 560 kilometres long, consisting mainly of sandy beaches. It is bordered by French speaking countries with Cote d'Ivoire to the west, Togo to the east, Burkina Faso to the north and Atlantic Ocean to the south. Ghana has wide access to the Atlantic Ocean as shown in Figure 4.3 and Figure 4.4.

With regards to trade, Ghana is ideally placed geographically at the centre of the Gulf of Guinea, enabling it to serve as a hub for ships operating between west and southern Africa. Ghana's economic growth has been increasing for the past decade with a gross domestic product (GDP) annual rate at an average of 7.07% from 2000 until 2016, reaching an all time high of 25% in the first quarter of 2012, and experiencing a record low of -3.80% in the first quarter of 2014 (Ghana Statistical Service 2016). The highs have been fuelled by its diverse and rich natural resources, and the emerging manufacturing sector, which have made Ghana one of the fastest growing countries in Africa (see Figure 4.5).

Figure 4.3: The Map of Ghana



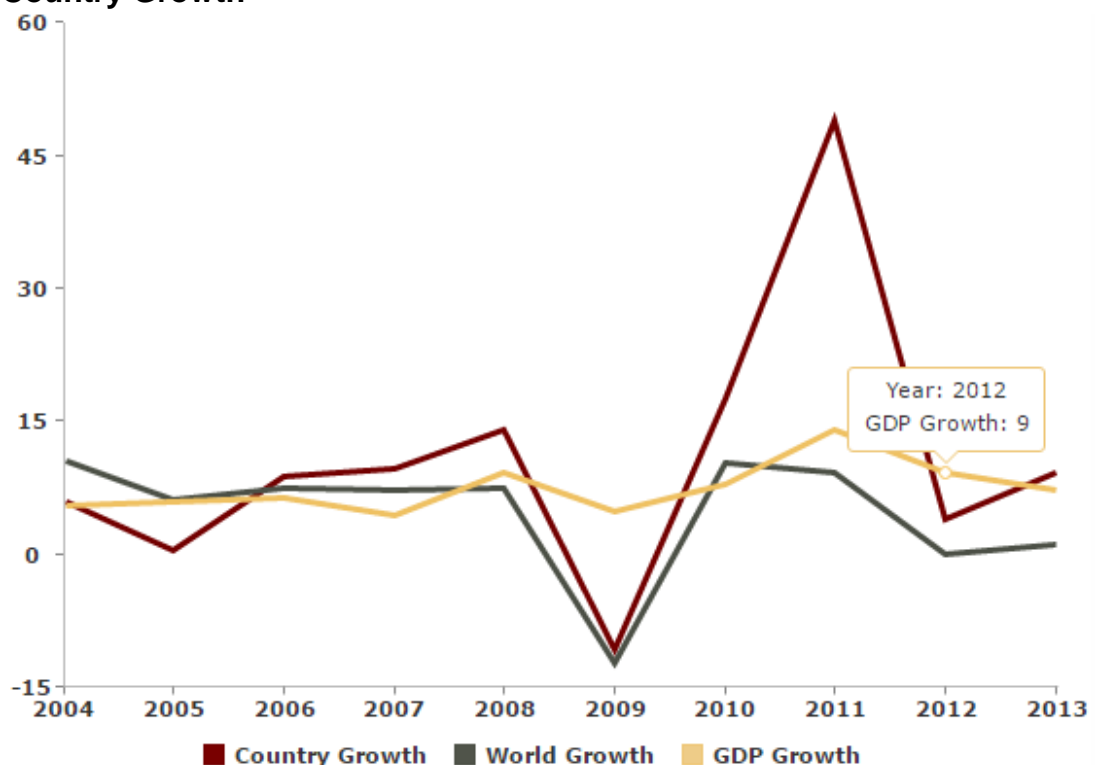
Figure 4.4: Geographical Location of Ghana

Ghana has lobbied to be a maritime hub to the West African market, so it needs to focus on delivering services efficiently, reliably, and with the same rigour and attention to detail that is expected in other leading global maritime transportation hubs in order for it to remain competitive. While Ghana's key exports range from raw materials to manufactured products, it relies mainly on natural resources such as gold, crude petroleum, cocoa beans and paste, manganese ore, refined petroleum, petroleum gas, processed fish, coconuts, coffee, timber and processed wood products (see Table G-1 Appendix G). These products are moved by sea from Ghana to customers in foreign countries therefore, require selection of suitable carrier to haul these products.

The Ghanaian economy has grown steadily over the last ten years, in part due to the high prices of primary commodities such as cocoa, timber and gold, and since 2011, oil. The pace of growth in the Ghanaian economy moderated in 2014, reaching 5% growth compared to previous years (Agentschap Netherlands 2015). Table G-2 Appendix G indicates the principal markets for Ghana's exports. While South Africa has been the main destination for Ghana's exports, contributing 27% of the export value, exports to European countries account for 32.5%, and play a substantial role in Ghana's economy.

The home market is very limited, even though the total population is promising at twenty-six million. However, Ghana is an important supplier of cocoa beans to Europe, and at the same time it relies on Europe for imports of clothing and semi-finished products.

Figure 4.5: Ghana's Real GDP Growth Rates v/s world Growth v/s Country Growth

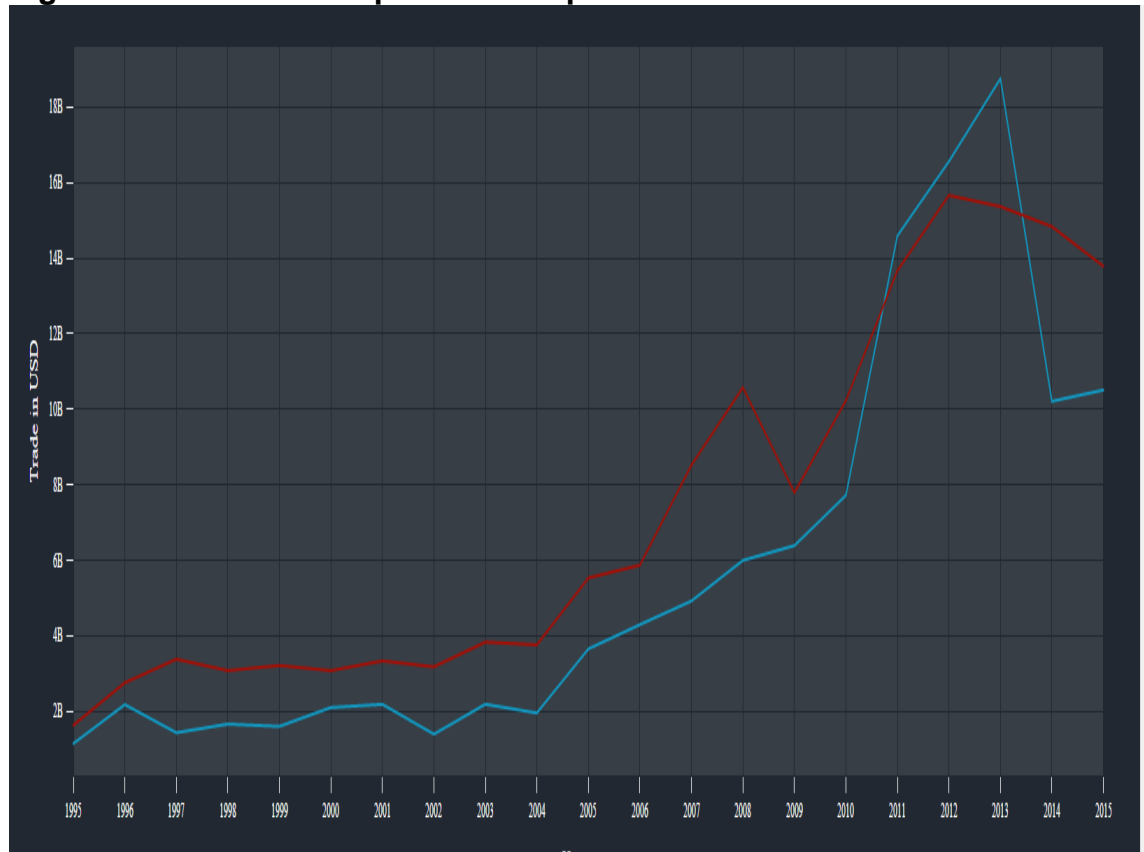


Source: Ghana Trade Statistics (2017 p.6)

Trade represents a significant portion of Ghana's economic growth, with exports and imports accounting for 44% and 50% of GDP respectively. Ghana's exports seem to lag behind its imports which could be an issue in its economic growth and development. However, the trend has changed over the past few years with its exports exceeding imports, as shown in Figure 4.6. The price for Ghana's traditional exports like cocoa and gold keep fluctuating in the world market.

In 2013 Ghana exported \$18.8 billion and imported \$15.4 billion, resulting in a positive trade balance of \$3.39 billion (see Figure 4.6). In 2013 the GDP of Ghana was \$48.59 billion and its GDP per capita was \$3.99k. The economy of Ghana has continued to expand by 3.9% year-on-year.

Figure 4.6: Ghanaian Exports and Imports 1995 - 2016



Source: The Observatory of Economic Complexity (2017 p.1)

Blue line: Exports

Red line: Import

The container volume also continued to grow on year-on-year, which was driven by electronic goods and transit volume to neighbouring landlocked countries (Ghana Ports and Harbour Authority 2014).

Figure G-1 shows the development of Ghanaian seaborne trade for the past five decades. Total cargo tonnage (in metric tons) has been on the increase since its lower record in 1980 (see Figure G-1 Appendix G).

4.3.2 THE CONTAINER SHIPPING SECTOR

Shipping has played a critical role in contributing to Ghana's economic development.

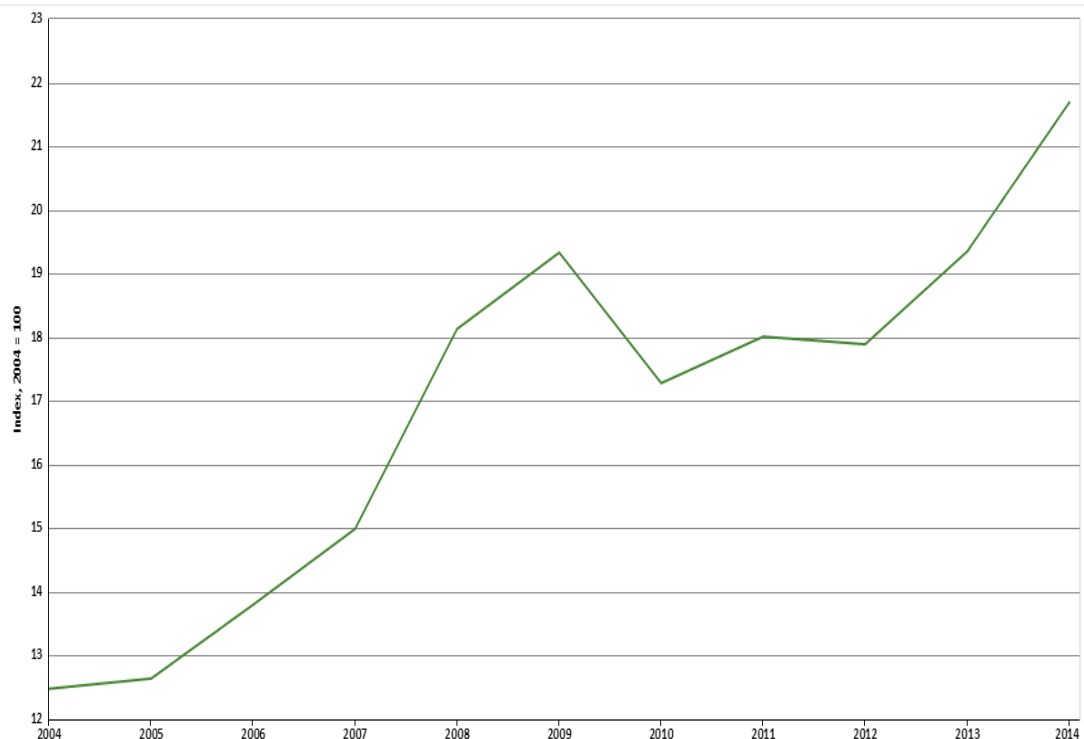
Figure 4.7 shows the structure of the country's imports from 2004 to 2014, which indicates the growth of the liner sectors over the period. As shown in Figure 4.7, Ghana's import liner trade has continued to grow rapidly. Figure 4.8 shows the structure of its exports from 2008 to 2012. Ghana's containerised exports grew considerably over that time. However, the dry bulk sector is doing better than the liner sector which is not surprising, since Ghana relies heavily on its export of raw materials and resources, which are highly suitable for bulk/tramp shipping. The cocoa export is seeing a new twist these days, with a small portion of exported cocoa being containerised which can be healthy for the liner sector in the future. The tramp and liner sectors require a service of freight forwarder to conduct cargo documentation formalities as cargo clearance through Ghana ports require a service of qualify freight forwarder.

As shown in Figure 4.9 the volume of Ghanaian containerised trade grew by 64% from 305,858 TEUs in 2003 to 841,989 TUEs in 2016 (Ghana Ports and Harbour Authority 2016). This growth has mainly been attributed to a shift from labour-intensive agriculture to capital-intensive manufacturing. Even in the phase of current economic crisis, container volume has continued to increase throughout Ghana, as a result of post-election war in the Ivory Coast's. Ghana is placed in the advantage position of being able to better attract container volumes from its neighbouring landlocked countries (Burkina

Faso, Mali and Niger) due to that post-election crisis. It is important to use liner shipping transport to support the continued growth of the Ghanaian economy to meet the market demand. Therefore, freight forwarders role is important in achieving this objective.

Over three million containers have been transported around West Africa each year since 2011 (Catram Consultants 2014), making it a dynamic and growing market for liner shipping companies. The number of TEUs passing through Ghanaian ports has been continually increasing, and it reached 900000 TEUs by the fourth quarter of 2013 (Catram Consultants 2014).

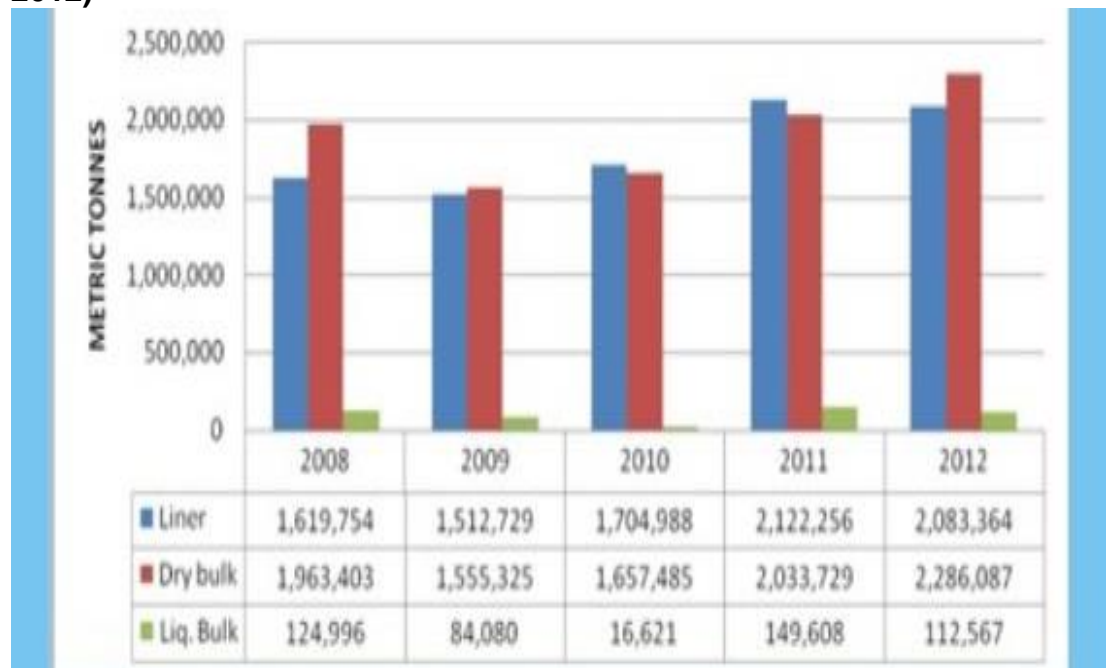
Figure 4.7: Ghana Import Liner Shipping Index (2004-2014)



Source: World Bank (2015 p.1)

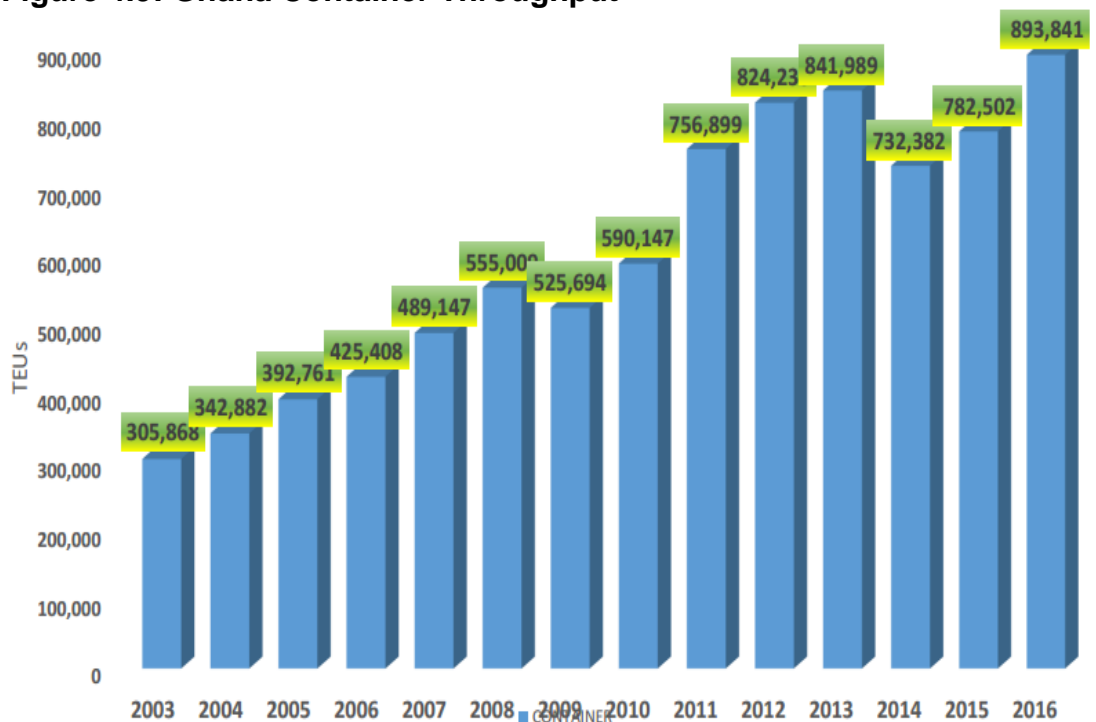
The growth in containerised trade has fuelled growth in the Ghanaian container shipping sector; and there are a growing number of container shipping companies establishing their presence in Ghana. Currently, there are eighteen container shipping companies registered with the Ghana shipowners association and operating in Ghana (see Table G-3 Appendix G).

Figure 4.8: The Performance of Export Trade per Trade Category (2008-2012)



Source: Ghana Shippers Authority (2013 p.9)

Figure 4.9: Ghana Container Throughput

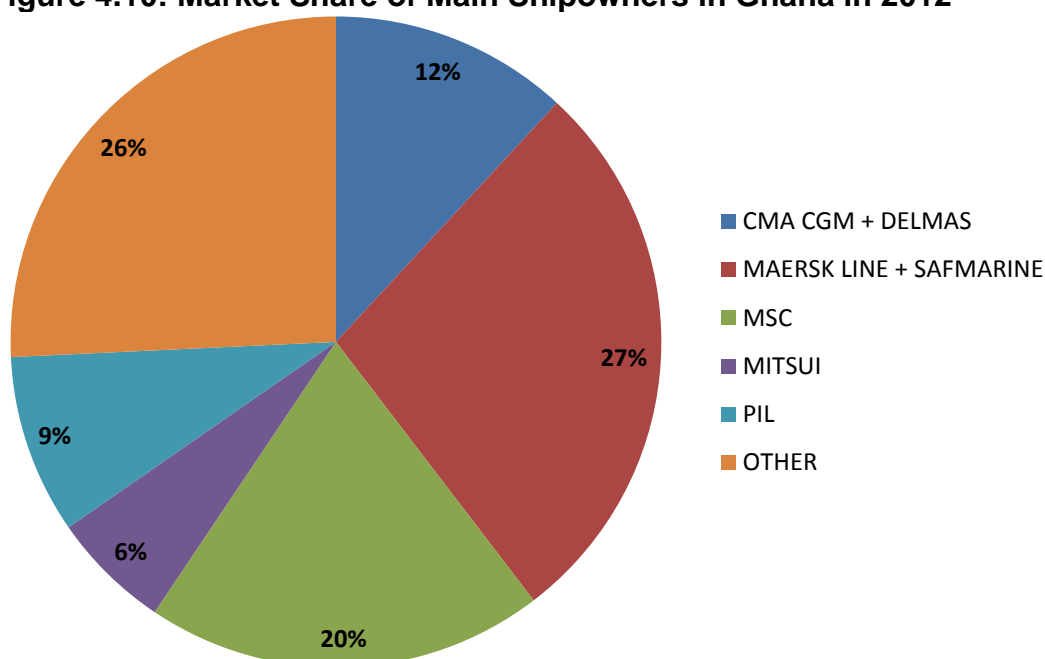


Source: Ghana Ports and Harbour Authority (2017)

According to the Shipowners and Agents Association of Ghana (2016) the liner shipping industry there is witnessing an increasing number of container shipping companies calling Ghana which are not currently members of the shipowners and agents association of Ghana.

The liner shipping industry in Ghana is dominated by a few large international operators such as Maersk Ghana Ltd, MSC and CMA CGM, which represent close to 60% of the total market share. Figure 4.10 shows the percentage market share of container shipping companies operating there. Maersk line and Safmarine control 27% of the liner market share in Ghana, with MSC controlling 20%.

Figure 4.10: Market Share of Main Shipowners in Ghana in 2012



Source: Catram Consultants (2013 p.54)

There is keen competition among the liner shipping companies operating in Ghana. Most of the container shipping companies working there provide purely maritime transport services while depending on freight forwarders for hinterland transport arrangements. Maersk Ghana Ltd however, is engaging in hinterland logistics processes and arranging for customs clearance and road transportation to the final destination for customer cargo. Each and

every container shipping company operating in Ghana is also employing various marketing strategies to attract customers to their shipping service.

In order for maritime transport to catch up with the needed demand of shippers, Ghana ports and harbour authority has invested \$438 million into upgrading the two sea ports (Tema and Takoradi) to handle the increase in container volumes (Ghana Ports and Harbour Authority 2014).

As Ghana ports expand their facilities to handle the growing container volume through the ports, there should be an equal improvement in the documentation clearance process to facilitate the movement of containers. According to Agentschap Netherlands (2015) cumbersome cargo clearance processes through Ghana's ports pose a challenge to shippers and are due to the complexity of agencies, outdated custom examinations and not well-implemented GCNet. In view of the cumbersome customs documentation process, the country needs efficient professional (freight forwarders) to expedite container clearance processes. Approximately, 90% of Ghana's foreign trade is handled by freight forwarders (Ghana Institute of Freight Forwarders 2016).

Despite for the past fifteen years the growing volumes of container traffic in Ghana, it has faced pressure from neighbouring countries, as all seaports in the West African region want to become the logistical hub and attract international cargo traffic as well as transit throughput to surrounding landlocked countries (Agentschap Netherlands 2015). Currently, Ghana is facing strong competition from the ports of Abidjan and Lome due to the risk of under capacity and cumbersome documentation process in both ports. Thus, freight forwarders effective coordination of documentation process will help facilitate faster movement of good through supply chain and foster quick ships turnaround time in port.

4.3.3 THE GHANAIAN FREIGHT FORWARDING SECTOR

There are two main types of freight forwarding operators in Ghana, these are self-declarants and brokers. Self-declarants are those that are mandated under LID 178 to transact the business of freight forwarding solely for themselves, and brokers are granted under LID 178 to transact their business of freight forwarding for any other client including themselves (Ghana Customs Excise and Preventive Service 1993).

The intensification of globalisation outsourcing and procurement across international borders has made the freight forwarding industry in Ghana versatile, thereby broadening the scope of its freight forwarders. The professionalism required in the freight forwarding service has brought expansion in the sector, making international freight forwarding companies more competitive than the local small and medium freight forwarding organisations of Ghana.

The freight forwarding industry in Ghana is challenged to meet the high expectations of cargo owners, as cargo owners are looking for forwarders who can provide freight services based on delivery duty paid (DDP) terms. Most importantly, mining companies, oil and gas clients and manufacturers operating in Ghana are looking for freight forwarders who can offer door-to-door service and pay all shipment charges on their behalf, and then later be reimbursed. For example, a freight forwarder who can pay shipper freight costs, warehouse charges, local terminal handling charges, import duties (if any) and local transport costs would be the kind of freight forwarding highly sought after in the Ghanaian context.

The maritime industry in Ghana needs efficient freight forwarding companies to facilitate the clearance process of goods in and out the country to support the growing liner shipping sector. From the perspective of West African container traffic, Ghana has been ranked number three, with keen competition from neighbouring countries (Catram Consultants 2014). However, ongoing expansion projects in Ghanaian ports could lift its ranking position in Sub-Sahara Africa to number one for container traffic handling.

As the liner shipping service in Ghana is growing, and thereby attracting the world's leading container shipping companies, there is a need for comprehensive research to be conducted in this area, focused on how competing liner shipping companies can attract more customer to their lines. Hence, this study intends to investigate the line shipping service sector in Ghana. Ghana was chosen as the demographical point of focus for this study so that it can help share more light on effective marketing strategies that liner shipping companies can employ there, which can set a standard for other similar studies to be conducted in the West African Sub-region.

This section has primarily discussed the Ghanaian liner shipping industry based on its economic development, its container market development, its transport infrastructure and its freight forwarding industry. The next section will discuss the survey design.

4.4 SURVEY DESIGN

This section discusses the techniques, approaches and processes used for data collection of this study. Considering the different types of data collection instruments available, a justification is provided for a type of sampling technique used and data collection instrument applied in this study.

4.4.1 SAMPLING

Sampling is the selection of a subset of individuals from within a statistical population to determine the characteristics of the whole population, or the use of a small number of members of a given population as a basis to produce inferences about the entire population (Fowler 2013). The quality of a study is often better with sampling when the sampling reflects the population (Cooper & Schindler 2006). Sampling is the process or technique of selecting a suitable sample for the purpose of determining parameters or characteristics of the whole population (Adams, Khan & Raeside 2014; Cohen, L, Manion & Morrison 2007).

Primarily there are two types of sampling techniques; these are probability and non-probability sampling (Adams, Khan & Raeside 2014). A probability is

a sample in which every element of the population has an equal chance of being selected while non-probability is where sample units are selected on the basis of personal judgement (Adams, Khan & Raeside 2014). This study has adopted probability sampling because it is held to be the most rigorous approach to sampling for statistical research. The choice of sampling strategy depends on the pattern of questions asked (Ritchie et al. 2013). Of importance in selecting the sample for the present study was enlisting a group of respondents who are knowledgeable and experienced in ocean carrier selection in Ghana, and who are able to provide information about the selection of ocean container carriers.

4.4.2 SAMPLING FRAME

The sampling frame is a list of members of the population under investigation, and it is used to select part of the population or universe of enquiry that is needed to reflect the population value (Adams, Khan & Raeside 2014; Cohen Manion & Morrison 2007). An appropriate sample frame provides details to inform selection, and is comprehensive and inclusive to provide a sufficient number of potential participants to allow high-quality selection (Ritchie et al. 2013). The current study research questions focus on liner operator selection from the freight forwarders' perspective, so it is important to draw the sample population that best represents the views of freight forwarders in Ghana regarding selection of ocean container carriers. For professionals like freight forwarders, published lists with further screening are the best option for drawing the sample frame (Gray 2013; Riff, Lacy & Fico 2014; Ritchie et al. 2013). As pointed out in Chapter 2, freight forwarders play a pivotal role in cargo movement, and so it is important to find out the important factors that they prioritise when selecting liner shipping companies.

Freight forwarders operating in Ghana were identified as a sample frame. Upon identifying the sample frame; all the freight forwarders operating in the sector were selected, which reflects the actual population. The rationale for using this sampling strategy was to increase precision without increasing

cost, and to reduce the sample variation. This method offers an opportunity to decrease sampling error towards a rising level of confidence (Saleh 2006). Also, this gives each sample equal opportunity to be selected and is an unbiased surveying technique. Furthermore, a sample that is highly representative of the population being studied gives a researcher opportunity for generalisation from the sample to the population.

The current research draws a total sample of 301 freight forwarders from the freight forwarder statistical population in the directory of the Ghana Institute of Freight Forwarders (GIFF) (Ghana Institute of Freight Forwarders 2015). The sample companies were cross-checked with the Ghana Shippers Authority to avoid double mailings. The targeted 301 population was the total number of freight forwarders operating in Ghana and registered under the GIFF.

GIFF is the legal body that represents freight forwarders in Ghana. Therefore, no one can legally engage in a freight forwarding business without registering with GIFF. The survey questionnaire was sent to email addresses provided in the GIFF directory, and the survey was directed to the attention of the managing directors and managers of the sample companies. These targeted respondents were deemed to be knowledgeable about their organisation's characteristics, operational levels and the performance of their firms. The study assumed that the managing directors and the managers are the better sources for getting reliable information, and this is in line with similar studies conducted on freight forwarders (Lai & Cheng 2004; Shang & Lu 2012; Wen & Huang 2007).

4.4.3 DATA COLLECTION METHODS

Primarily there are two sources of data collection, that is, primary or secondary sources. Secondary data is based on previous research or data collected by someone else in books, journals or internet websites, and it is economical to access in terms of time and cost, and a more diverse sample can be used (Daas & Arends-Tóth 2009). Secondary data helps researchers get quick access to high-quality data at less cost and time, and at the same

time it offers the researchers an opportunity for longitudinal analysis and cross-cultural research over time (Bryman 2012). Hence, secondary data has been used to gain an understanding of previous factors influencing freight forwarder decisions which have been identified by previous studies. These help in designing appropriate research questions.

Primary data is original data collected by a researcher via the information of questionnaires contributed to by target participants. According to Hox and Boeije (2005) primary data is data that is collected for a specific research problem at hand, using procedures that fit the research problem best. Research data collection and analytical processes can take various forms such as case studies. Alternatively they can be field experiments rather than purely laboratory experiments, they can investigate descriptive versus causal relationships, they can be observational or survey based, or they can be explanatory and exploratory research (Creswell 2013; Zikmund et al. 2013). However, a common technique used by researchers in primary data collection is survey research, direct measurement, and observation (Rea & Parker 2012). In view of that, this study has employed a web-based survey technique for data collection to inform and answer a specific research problem on the selection criteria of liner operators.

4.4.4 DESIGN OF THE WEB-BASED SURVEY INSTRUMENT

The survey as a research tool generalises the carrier selection factors of freight forwarders as a sample population (Shang & Lu 2012). Surveys produce statistics, that is, quantitative or numerical descriptions about some aspects of the study population, and they enable researchers to collect information about a fraction of the population (Fowler 2013). Technology, in the form of ever growing access to the internet, smartphones and the availability of lists of addresses, makes it easier for a researcher to collect data using surveys. This study employs survey research in order to collect data from a relatively large number of respondents (301, in this case).

A survey method was employed in the current study, more specifically, a web-based survey to disseminate the questionnaire to respondents. Web-

based questionnaire surveys are 'hosted' on a 'server' linked to the internet and respondents visit the host web-site to complete the questionnaire (Denscombe 2014). The questionnaire for the current study was hosted on a Google document server that enabled the respondents to complete the survey at their convenience.

Web-based surveys are becoming more and more feasible and are much more widely used (Bandara 2015; Dillman 2011; Dolnicar, Laesser & Matus 2009; Hung & Law 2011). The web-based survey technique was applied here to collect data from the demographic of freight forwarders in Ghana in a convenient and efficient way. The electronic web-based survey method was ideal for this study for various reasons. According to Griffis, Goldsby and Cooper (2003) web-based survey methods improve urgency, increase delivery speed, reduce data entry error, and provide researchers with the ability to understand dropout reasons. Even though the web-based survey was termed to have lower coverage than mail surveys due to frequent changes in people's e-mail addresses and internet service providers, nevertheless web-based surveys can provide significant higher response rates, save time, enhance speed and reduce costs (Cobanoglu, Warde & Moreo 2001). Rea and Parker (2012) and Denscombe (2014) also stipulate that web-based surveys have the following advantages which this study has also employed:

- They are a convenient and efficient way of reaching potential respondents. Respondents can receive the survey and complete it in the privacy of their own home or office.
- Rapid data collection of information can be timely collected and processed within days.
- They are more cost-effective than traditional mail-out surveys.
- Respondents are not pressed for time and can consult records to answer questions.
- They are easy to follow-up, and potential respondents can be reminded to respond to the survey through e-mail messages.

- Confidentiality and security are guaranteed. Personal or sensitive information supplied by respondents can be protected on a secure server through the efforts of the research team.
- They are used particularly in reaching specialised or well-identified populations whose email addresses are readily available.
- They provide an environmentally friendly approach to conducting research. Online surveys reduce the need for paper and eliminate the need to travel. In the case of the present research for example, the researcher did not have funds to travel to Ghana for data collection.

Electronic web-based survey research can help a researcher to make generalisations based on a sub-set of the total population.

4.4.5 SURVEY QUESTIONNAIRE DESIGN

The development of the questionnaires was based on the conceptualisation of factors identified through the extant literature as having a significant effect on carrier selection criteria. Also based on the discussion with professionals in the freight forwarding industry. The questionnaires were designed precisely in such a way that it would not take respondents excessive effort to answer them. The questions were evaluated through a pretest to discover if they were easy to understand (Fowler 2013). The questionnaire started with the profile and general information of the respondent's organisation to make them feel more comfortable, before going into section B about factors that influence their carrier selection. The design of the questionnaires adopted the guidance outlined by researchers such as Churchill and Iacobucci (2010) and Denscombe (2014). The full details of the questionnaire can be seen in Appendix C of this study.

The survey instrument was divided into four sections, and its aim was to achieve four important objectives. Section one being comprised of four questions, section two, thirty-nine statements requesting the respondents to choose their level of agreement. Section three contained five open-ended questions and section four asked two questions about the respondent's profile. The following sections explain the four sections of the questionnaire.

4.4.6 SECTION A: ORGANISATION PROFILE

This section seeks information on characteristics of the organisations that the survey participants belonged to, which included the number of years that the organisation has been in operation, the number of employees it had, the type of business operated by it, and the type of services provided by it. The purpose of this section was to identify the type and the size of the freight forwarding companies making decisions about ocean carrier selection. According to Murphy and Daley (1995) and Wen and Lin (2015), the size and category of freight forwarding companies partially influences their carrier selection decision making. It is imperative for this study to understand the type of freight forwarding services that are provided by freight forwarding firms in Ghana.

Table 4.2 presents the overview of the survey questionnaire.

Table 4.2: Questionnaire

Section A	A1. Number of employees working in the organisation
	A2. Number of years the organisation has been in operation
	A3. Type of business provided by the organisation
	A4. Type of services provided by the organisation
Section B	B1 – B39 (The level of agreement of statements on the Likert scale 1 – 5)
Section C	C1. In addition to the 39 factors, what other factors would you consider
	C2. What are the challenges in choosing the right shipping lines for your clients
	C3. What aspects of shipping services need improvement
	C4. How does the shipping line's relationship with other actors affect your choices
	C5. If you wish, please write any comments you feel may be relevant to this study
Section D	D1. Your position in the organisation
	D2. Years of working experience in the freight forwarding sector

Questions A1 and A2 were designed to collect information on the respondent's organisation. The number of years that the respondent organisation has been in operation, and the number of employees working in the participant organisation is relevant data to a firm decision making. The number of employees, and the number of years that the respondent's organisation has been operating seems to not have had a significant impact on their decision making. However, this information helps confirm the validity and accuracy of the information gathered in the questionnaire.

Questions A3 and A4 seek information from survey participants on the type of business operated by the respondent organisation. The literature has shown that the type of services provided by freight forwarding companies reflects the volume of cargo tendered by them to shipping companies. The type of business provided by freight forwarding companies influences their carrier selection decision-making (Murphy & Daley 2001). The bigger freight forwarding companies which tendered a high volume of cargo tend to focus more on cost-related factors, while the smaller freight forwarding companies tend to consider service related factors (Wen & Lin 2015).

4.4.7 SECTION B: FACTORS INFLUENCING FREIGHT FORWARDERS' CHOICE OF SHIPPING LINE

Section B of the questionnaire was designed to collect information from respondents about the factors that influence their decision-making when choosing shipping lines, and also to ascertain the importance that they attach to each factor when doing so. As discussed by Wen and Huang (2007) and Wong, Yan and Bamford (2008), it is important to identify the factors that influence freight forwarder selection of ocean carriers.

A five-point Likert scale questions were used in this section to collect data from the respondents with 1 denoting strongly disagree and 5 representing strongly agree. The data analysis techniques used to analyse data for this section are exploratory factor analysis and confirmatory factor analysis as discussed in section 5.3 and 5.4 respectively. Exploratory factor analysis is used because firstly, EFA does not allow the researcher to impose a

predefined structure on the outcome (Suhr 2006). Secondly, EFA has been widely used in transportation studies i.e. ocean carrier selection (Hu & Jen 2010; Lu 2007; Shang & Lu 2012; Tuna & Silan 2002; Yang 2012). Thirdly, EFA is very useful in collecting information about the nature of the variables, from observing which factors contribute to the performance of which variable, to quantifying the degree to which each variable is associated with underlying factors. Factors will be retained with all items within a factor loading of $>.5$ to indicate a high correlation with the identified factors. Confirmatory factor analysis (CFA) will be conducted to further analyse and confirm the relationships among the factors identified in the exploratory factor analysis, producing a modal fit for latent factors. It also is used to examine the internal consistency of the observed item and determine whether each observed variable should be retained, or if any exclusion should be made. CFA is widely used by researchers in business studies (Hu & Jen 2010; Lu 2007; Saleh 2006; Yang 2012). The analysis to be conducted in this section shall enable the researcher to answer research question 1 and 2.

4.4.8 SECTION C: OPEN ENDED QUESTION

The objective of this part is to solicit information from the respondents to check the data obtained in section B. The question in section C seeks to acquire further information on the challenges faced by freight forwarders when selecting ocean carriers for their clients. It also serves to explore the areas that freight forwarders view as important when they choose shipping companies. This section shall be used to answer research question 3 and partially support research question 1 and 2.

Content analysis shall be used to analyse responses obtained in section C, as this is a form of testing and measurement (Rourke & Anderson 2004). Content analysis is a technique used for systematically describing written, spoken or visual communication and it can provide a numerical description for that. In using content analysis, the study shall observe common patterns within the open-ended question responses, and categorise each item so as to offer a meaningful description. The identified categorised items shall be

linked together to obtain common themes, and those themes shall be further examined to verify their relevance to this study. Upon further examination of the content and themes, some categories and themes may need to be merged together.

4.4.9 SECTION D: RESPONDENT PROFILES

This section of the survey aims to obtain details on the profiles of the participating respondents. The information requested here shows the profile sample by job title and years of experience gained in the freight forwarding sector. This information will help to confirm the validity and accuracy of the information gathered in the questionnaire with regards to who it is that is making ocean carrier selection decisions in the freight forwarding sector. The number of years respondents have worked in freight forwarding can provide insight on their choice of decision making, because that should indicate sufficient experience, knowledge and expertise in their decision making. Descriptive statistics shall be used to display the results of respondents using a visual graph, for example, a pie chart.

4.4.10 PRE-TESTING

As explained by Adams, Khan and Raeside (2014) a small-scale pre-test gives an advance opportunity for the researcher to check the data collection form and minimise errors due to improper design elements. For example, in checking the question wording or sequence, finding out if the questionnaire is too long or short, conducting procedural analysis and uncovering other such problems such as fieldwork errors.

The pre-testing phase of the research was conducted using experts, that is, eleven Australian Maritime College department of Maritime Logistics Management (MLM) staff, ten fellow Ph.D. Candidates of the Australian Maritime College and four professionals from the freight forwarding sector in Ghana, to determine whether the data collection instrument for the present research was appropriate. It also functioned to ascertain the thirty-nine

elements discovered in the extant literature. See Appendix B-1 for the pre-test survey.

In the pre-test on average it took the participants around 15 minutes to answer all of the questions. As a result of the pilot research, the survey instrument was reviewed by deleting, adding and revising some of the questions for appropriateness to the participants. The reviewed questionnaires were then submitted with other relevant documents to the ethics authorities for approval.

4.4.11 RESEARCH ETHICS

The current study adhered to the University of Tasmania's research policies and ethical procedures. Good research is conducted in a responsible manner and takes into consideration most importantly ethical issues so that the work can project integrity, accuracy, honesty, transparency, objectivity, and best practice among others within legal confines (Australian Government 2007a). Also, making sure that no one is harmed or suffers consequences from research activities is paramount to good research practice (Cooper & Schindler 2006). Ethical issues were addressed adequately through every stage of this research. Important ethical issues were comprised of confidentiality and anonymity, informed consent, privacy, ownership of data and conclusion, use and misuse of results, honesty and trust, reciprocity, intervention and advocacy, harm and risk, and conflict of interest (Gray 2013; Punch 2013).

Formal ethics approval was obtained from the Human Research Ethics Committee (Tasmania) Network (HREC) see Appendix A-1. The Tasmania Social Sciences HREC (SS HREC) is the approving authority for the ethics proposal of this research. The requirements of the ethics proposal for SS HREC reflect the National Statement (NS) on Ethical Conduct in Human Research Australian Government (2007b) and the Australian Code for the Responsible Conduct of Research (Australian Government 2007a). This research obtained the consent of participants, it respects the privacy of participants, avoids the use of deception and any form of harm to participants

by providing an information sheet to participants (see Appendix A-2). Furthermore, to make sure that the questionnaire is appropriate for the respondents, pilot questionnaires were distributed to staff of the Australian Maritime College (AMC), fellow Ph.D. colleagues at AMC and the selected freight forwarders in Ghana.

4.4.12 WEB-BASED SURVEY ADMINISTRATION

The current study employed the following survey administering measures to reduce the non-response rate and improve the response rate, while taking into consideration suggestions put forward by many authors (Adams, Khan & Raeside 2014; Baatard 2015; Babbie 2015; Dillman 2011; Hung & Law 2011; Nielsen 2011).

- A. The survey link was sent to participants using the researcher's email address. The researcher assigned a web-based collector to the designed questionnaire: a web link collector provides the opportunity to collect anonymous responses. All of the responses from the participants were collected at one designation on the Google document form website. The collector was setup to:
 Allow flexibility for the respondents to return to an incomplete survey on the site at any time to edit or complete it.
 Allow one response per participant and block multiple responses from the same participant.
- B. The researcher sent personalised emails to the attention of the managing directors and managers of the 250 sample respondents to inform them about the survey. A brief summary of the research, as well as the participant's information sheet were included in the email, and also the web-link to the survey was provided. The first page of the survey was a welcome screen with clear instructions to motivate respondents.
- C. The researcher used email to send the first reminder to the respondents, exactly two weeks after the initial mail containing the survey link was sent. The second reminder was sent a week after the

first reminder. The third and last reminder was sent a day before survey closing date. All the email messages of the reminders sent contained the survey link with the following message highlighted in bold: “If you have already completed and submitted your questionnaire then please disregard this email”.

D. Finally, a day after the third reminder the survey was closed at 24 hours Australian Eastern Standard Time (AEST).

All the messages sent to the respondents, including the pre-notification email, the invitation email and the reminder emails are in Appendix B-2, B-3 and B-4 respectively.

4.5 SURVEY ERROR CONTROL

This section discusses the techniques, and processes used for data analysis and techniques employed to ensure validity and reliability of this study. Given that error control is crucial in ensuring quality research, a justification is provided for the techniques used for error control to ensure overall research quality.

4.5.1 DATA ANALYSIS

Data analysis involved analytical processes such as data comparison, data correlation, and data integration (Creswell & Clark 2007; Onwuegbuzie & Teddlie 2003). Data correlation was conducted to discover relationships between the factors (Treiman 2014). Inferential statistics is a body of methods used to draw conclusions or inferences about characteristics of populations based on sample data (Keller 2012). The inference is not limited to answering research questions; rather it helps to develop new understandings and explanations (Keller 2012; Teddlie & Tashakkori 2009).

In order to run data analysis, the data was downloaded from the Google document into an Excel file and then imported into SPSS version 22. The collected data was subjected to Cronbach’s alpha test for internal consistency coefficient. See section 5.3 in Chapter 5 for a full discussion on internal consistency.

4.5.2 RELIABILITY AND VALIDITY

Reliability in quantitative research refers to how far a particular test, procedure or tool, such as a questionnaire, can produce similar results in different circumstances, assuming nothing else has changed; while validity refers to the extent of representative and measurement accuracy (John & Benet-Martínez 2012; Roberts, Priest & Traynor 2006). The measurement of validity in research can be classified into two broad categories: external validity and internal validity (Roberts, Priest & Traynor 2006). Internal validity addresses the reasons for the outcomes of the study, and internal validity can be assessed by the following; content validity, criterion-related validity and construct validity (Roberts, Priest & Traynor 2006). Also, external validity measures whether the results of a study can be generalised beyond the specific research context (Bryman 2012). Reliability and validity are the most important factors in ensuring data quality is achieved in research (Rubin & Babbie 2013). Data quality enhances inference quality, and research findings that are based on quality data produce quality conclusions (Tashakkori & Teddlie 2010; Teddlie & Tashakkori 2009).

Construct validity demonstrates the relationships between the factors under study and whether the construct or the concept reflects the theory that it is supposed to be denoting (Bryman 2012; Roberts, Priest & Traynor 2006). Cronbach Alpha coefficients (α) were used to test the reliability construct of liner operator selection criteria from the perspective of freight forwarders to ascertain whether the strategic dimensions are reliable (Creswell 2013; Cronbach 1951). The acceptable value for Cronbach's alpha is 0.70 (Hair et al. 2010).

The following was undertaken to ensure validity;

- A. The survey instrument was prepared based on discussion outcomes and the literature review. The literature review covered carrier selection issues from different parts of the globe for shippers and freight forwarders; thereby addressing external validity, construct validity and the generalizability.

- B. Pre-test participants, consisting of academics and professionals were asked to comment on the content of the questionnaire, the wording and scale of the items. These steps enhanced the content validity of the survey instrument.
- C. Choosing from published lists with further screening so as to draw the sampling frame for data collection also enhanced the internal consistency of this study.
- D. Convergent and discriminant validity were reported during exploratory factor analysis and confirmatory factor analysis (detailed discussion is in Chapter 5). The results of factor analysis also illustrated the construct validity of the instrument (Roberts, Priest & Traynor 2006; Tabachnick & Fidell 2001).

4.5.3 DESCRIPTIVE STATISTICS

Descriptive statistics were used to analyse Section A of the questionnaire. They deal with methods of organising, summarizing, and presenting data in a convenient and informative way by using graphical techniques or numerical techniques (Keller 2012). They provide a summary of statistics or visuals which can simplify understanding, and which present the display of data in charts, graphs and diagrams, as well as calculating percentages, frequency distribution, averages, and measures of distribution and correlation (Brown 2014; Byrne 2013; Teddlie & Tashakkori 2009). Descriptive statistics allow the researcher to give meaning and insight to the data collected (Grove & Burns 2005). Data will be displayed using tables, graphs, and charts. Overall mean scores and standard deviations will be ranked from the most important to the least important so as to ascertain which categories of freight forwarding business and services are the most dominant in terms of decision-making in liner operator selection. The questionnaire was divided into four sections.

The first section of questions is designed to obtain general information about the structure of the freight forwarder's organisation and characteristics of the company, including the types of service provided by the company. The

second section focuses on getting detailed information from freight forwarders on the important factors which they consider when choosing shipping lines, and the levels of importance that they attach to each factor. A five-point Likert scale was used for this, where 1 denotes strongly disagreeing and 5 denotes strongly agreeing.

Section three is an open-ended question that was designed to get respondents' views on shipping line service levels and the challenges faced in selecting the 'best' shipping lines for their clients. The open-ended questions were limited to five questions to maximise objectivity. As mentioned in section 4.4.8 a content analysis was used to analyse the open-ended questions. Lastly, section four was designed to obtain information about the participants themselves and their capacity within their organisations. To properly differentiate between answers, a wider five-point scale with a neutral middle point was chosen over the narrower three point scale, or the four point scale without a neutral middle point (Deepen 2007).

4.5.4 RESEARCH ERRORS AND CONTROL

Research errors arise through various means. There are four main dimensions to errors in research, such as sampling errors, sampling-related errors, data collection errors and data processing errors (Bryman 2012). Given possible errors in the sampling and data collection process, this research employed strategies to mitigate or minimise any research related errors that may have arisen throughout the processes. Additionally, the processes of preparing, pre-testing, and administering the web-based survey were enhanced to enable the researcher to control respondents' errors.

The study adhered to the following steps so as to reduce errors in the research.

- The literature review and discussions with academics, practitioners, colleagues and supervisors at the Australian Maritime College formed the basis upon which the research problem and topic were chosen. A researcher cannot conduct significant research without first

understanding the literature in the field of study (Gray 2013). The research problem and topic were presented to a panel of judges during the confirmation of candidates for the appropriateness of the research objectives. The panel of judges critically assessed the research and approved it during the confirmation of candidature process.

- A structured questionnaire was developed to explore the factors influencing the selection of ocean carriers.
- A simple web-based questionnaire using very basic codes was used to ensure a consistent look and to enhance user-friendly characteristics, irrespective of the respondent's computer set-up.
- The questions were unambiguous, and were added in correct order and scale and also were presented in a similar context as that recommended by (Dillman 2011).
- An invitation letter or email and an information sheet were made available to every respondent to avoid measurement error as pointed out by (Dillman 2011; Punch 2013).

4.5.5 SAMPLING ERROR

Sampling error may occur when the estimate or sample being surveyed differs from the population value (Adams, Khan & Raeside 2014). This type of error may happen if the freight forwarders surveyed did not represent the true value of freight forwarders making shipping line selection decisions in Ghana (Arber 2001; Greener 2008). Therefore, the accuracy of the estimate population (Ghanaian freight forwarders) was improved in the current research to minimise sampling error or expected difference (Adams, Khan & Raeside 2014; Arber 2001). This research considered a comprehensive list of freight forwarders operating in Ghana for the web-based survey (Ghana Institute of Freight Forwarders 2015).

The Ghana Institute of Freight Forwarders represented the total population of the freight forwarders operating in Ghana, because no company can engage in a freight forwarding business without registering first with GIFF, except

those who are operating as self-declarants. Though survey research also has some disadvantages, including volunteer bias and distortion. Distortion may arise when a subject does not respond honestly to questions. Volunteer bias occurs when a sample of volunteers is not representative of the general population (Aday & Cornelius 2011; Minckler 2011). However, the present study targeted the entire population of freight forwarders operating in Ghana. Therefore, the precision of the estimate of freight forwarders was increased by reducing the standard error of estimation of freight forwarders by drawing the sample from the statistical population of freight forwarders. The precision of estimate accounts for good sampling can reduce sampling error (Cooper & Schindler 2006).

4.5.6 INDUCED BIAS

The current study adopted the following means to minimise the non-response rate. Firstly, a self-explanatory email and three reminder emails were sent to participants within the survey period before closing the web-based survey. This technique was effective in increasing the response rates from respondents. Secondly, approaching the president of the Ghana Institute of Freight Forwarders to request that he encourage his members during their meetings to participate in the survey was carried out as an alternate way to increase the response rate. Thirdly, to minimise the non-response sample, the survey requested the assistance of the freight forwarding association and requested that they post a message on the association website to inform their members that those who received the questionnaire from the researcher should endeavour to participate in the research survey. This approach is supported by De Vaus (2013); Gurning (2011) and Howe et al. (2013).

4.6 SUMMARY

This chapter has discussed the research methodology and survey procedures used in this study. The objective of this chapter and the subsequent chapters is to use the primary data collected from this survey of freight forwarders to answer the research questions highlighted earlier in this chapter and to explore dimensions of freight forwarder transport service

buying decisions through the identification of influential factors that they incorporate in their decision making process.

The research design employed in this study was one that attempts to explore the objective knowledge and experiences of freight forwarders involved in ocean container carrier selection decisions. This chapter presented the methodological framework employed by the study to answer the research questions and to test the research hypotheses. The methodological framework presented in this chapter is based on data and information gathered from freight forwarders based on an online questionnaire completed by those of them who are registered in Ghana. The total population were targeted from the official published lists of freight forwarders made available by the Ghana institute of freight forwarders. This chapter also discussed the Ghanaian liner shipping market which includes economic development, container traffic flow, port infrastructure and the freight forwarding sector.

The study applied a pre-test as a quality control measure to check the appropriateness of the study and to clarify the content of the survey questions as well as polish the survey process. The pre-test involved both academics and professionals in order to be able to increase the response rate of the survey. There are other measures that this study has included to minimise error and bias during the survey.

The study employed Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to unveil the factors that influence ocean carrier selection decisions from the freight forwarder's perspective. The results of the EFA and CFA that are to be conducted on the data gathered by the structured questionnaire of carrier selection will enable the researcher to determine factors influencing the competitiveness of ocean container carriers from the perspective of Ghanaian freight forwarders. The next chapter analyses the view of Ghanaian freight forwarders on the factors that influence their selection of ocean container carriers.

CHAPTER FIVE

ANALYSIS RESULTS

CHAPTER 5 RESULTS OF THE RESEARCH SURVEY AND DATA ANALYSIS

5.1 INTRODUCTION

This chapter presents the results of data analysis of the empirical study. As presented in Chapter 1, the objective of this study is to identify the important factors that influence the competitiveness of liner operators from the perspective of freight forwarders. As explained in Chapter 4, a web-based survey of freight forwarders was used to collect data about their selection of ocean container carriers on behalf of their clients.

This chapter consists of five main sections. The next section provides the demographic information of the survey respondents, and descriptive statistics of the variables. The third section presents the results of the exploratory factor analysis (EFA) that identify the underlying factors influencing liner operator competitiveness from the freight forwarders' perspective. The fourth section presents the result of confirmatory factor analysis (CFA) which explore the relationship between the underlying factors of liner operators' selection. Finally, Section 5 provides a summary of the chapter findings.

5.2 CHARACTERISTICS OF SURVEY RESPONDENTS

This section describes the characteristics of the research sample, the response rate, respondent organisation profiles and respondent profiles.

5.2.1 SAMPLE

As explained in Chapter 4, a survey of Ghanaian freight forwarders was conducted to collect data, especially the survey questionnaire was developed based on a literature review and discussions with academic and professional freight forwarders.

The sample of freight forwarders was drawn from the member list of the Ghana Institute of Freight Forwarders (Ghana Institute of Freight Forwarders 2015). In total, there were 301 members in the association together with 250 companies having email addresses and telephone contacts. To maximise the

sample size, all of these 250 companies were targeted. The sample companies were cross-checked with the Ghana Shippers Authority to avoid duplicate mailings.

Initially, a pre-notification email was sent to the targeted respondents a week in advance to introduce the topic to them. Approximately one week after sending that, a questionnaire survey was sent to the attention of managing directors and managers of the freight forwarding companies. The managing directors and managers were targeted because they were deemed knowledgeable about the characteristics of their organisations, their service level, operational capabilities and the liner operators' selection performance of their companies. Only one response was solicited from each sample company.

This study acknowledges that bias in data collection may arise from the use of a single respondent from each company. However, the study employed the strategy of using a key informant because such a person has the necessary knowledge to respond to the questionnaire as a very reliable source of information (Lai & Cheng 2004).

The initial mailing elicited 57 undeliverable responses due to incorrect email addresses because the companies were no longer in business, or their email addresses had changed. A large number of undelivered returns might also be due to the dynamics of the freight forwarding industry in Ghana. This reduced the effective sample size to 193. Out of 57 undelivered responses four came with out of office messages.

The first follow-up mailing was sent two weeks after the initial mailing of the survey questionnaire, and then a second reminder was sent a week after the first follow-up mail, and finally the third reminder was sent a day before the survey's closing date. Web-based survey is preferred in this study because it saves time, enhances speed and reduces costs while it can provide a reasonably good response rate (Cobanoglu, Warde & Moreo 2001; Denscombe 2014).

A total of 112 responses were received after the three follow-up reminders had been sent out, and of these, seven were returned incomplete with significant data missing. Hence, they were not included in the data analysis. One respondent returned the questionnaire saying that it was too long and so he could not proceed with it. Two additional respondents replied saying that their respective company's administrative network systems did not allow them to open the survey link. Therefore, they were unable to complete the survey.

A total of 105 usable questionnaires were collected, representing 54.4% of the target sample. In summary, there were 105 usable responses, 55 in the first and second weeks, and 50 responses received in the third and fourth weeks, representing an effective response rate of 54.4 % (105=193). This response rate is comparable to those obtained in previous studies of a similar nature (Lai & Cheng 2004; Murphy & Daley 2001; Shang & Lu 2012). Figure D in Appendix D shows the total valid 105 responses received every day over the one month survey period.

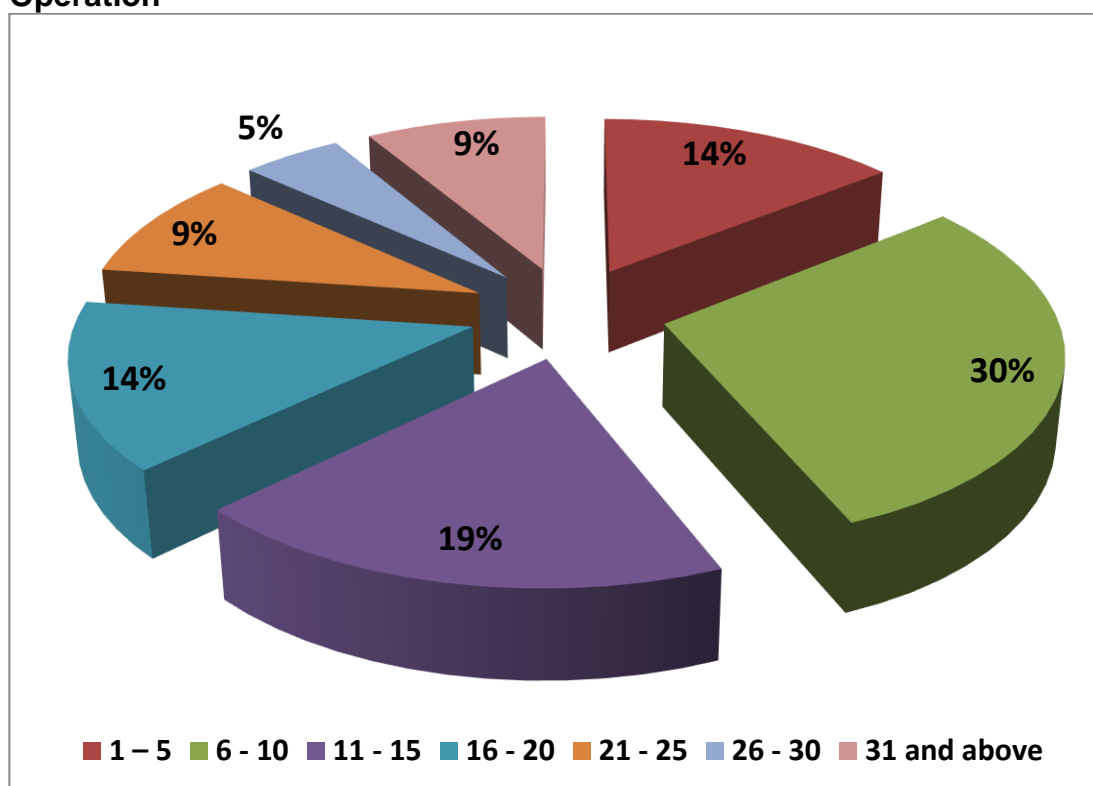
As the survey response rate was less than 100%, a non-response bias could contaminate the reliability of the study's findings (Shang & Lu 2012). Therefore, a test of non-response bias was conducted (Armstrong & Overton 1977; Lai & Cheng 2004). The non-response bias was assessed by dividing the 105 responses into two groups, namely early (n¼55, 52.3%) and late (n¼50, 47.7%) respondents. No significant differences were found between them. Therefore, it was concluded that there was no evidence for nonresponse bias.

5.2.2 RESPONDENT ORGANISATION PROFILES

This section presents information about the profiles of the respondent companies with regards to their main business activities (the kind of freight forwarding businesses provided to their customers), their firm's size (number of employees working in the organisation), their firm's age (number of years in the freight forwarding business) and their service capability (the nature of freight forwarding services provided to the customers).

Figure 5.1 shows that 14% of the respondent organisations had been operating in the freight forwarding sector for less than six years, 30% for less than 11 years, 19% for more than 11 years but less than 16 years, 14% had close to 20 years operations experience, 9% between 21 to 25 years, 5% for over 25 years but less than 30 years, and 9% had over 31 years of operational experience. The results indicated that the majority of the respondent organisations (86%) were seasoned freight forwarding companies who had been in operations for more than six years. Nearly 60% had been in the freight forwarding business for more than ten years.

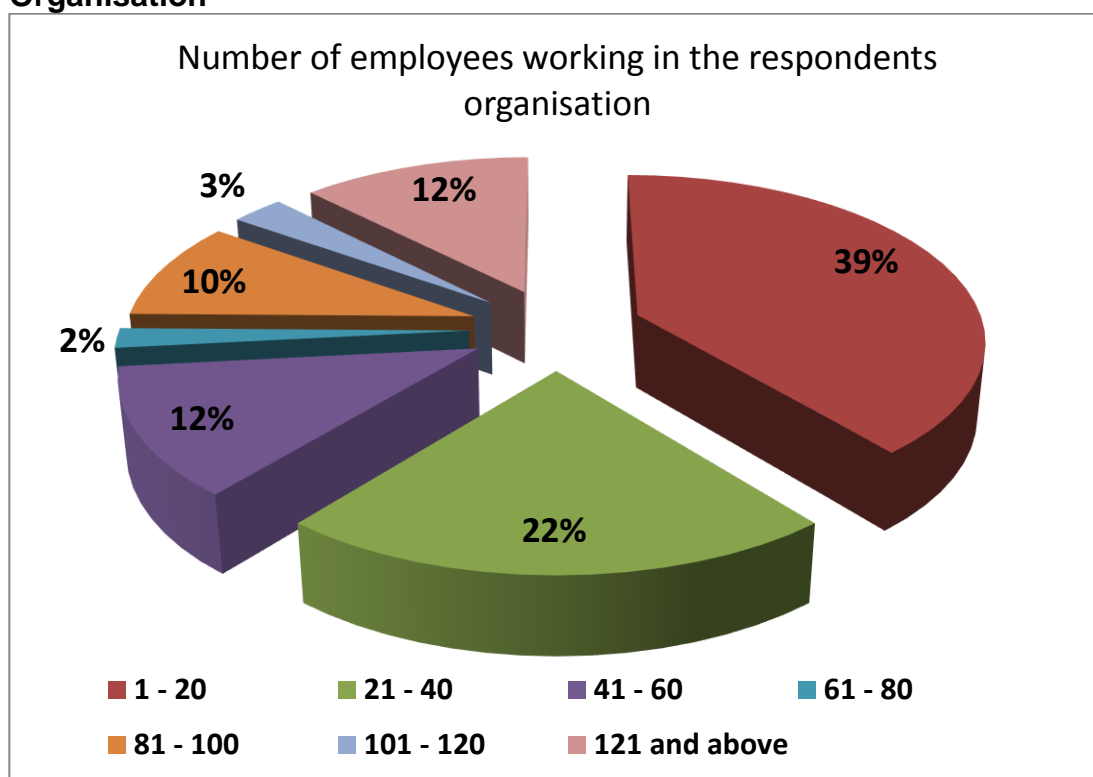
Figure 5.1: Number of Years Respondent's Organisation had been in Operation



The respondent organisations were characterised by small sized companies based on the number of employees that worked in them. As shown in Figure 5.2. 39% of the respondents have less than 20 employees, 22% less than 40 employees, 12% had between 40 to 60 employees, 2% had around 61 to 80 employees, while 10% had 81 to 100, and 3% 101 to 120 employees. Finally, 13% had over 121 employees working in their companies.

In summary, most of the 105 respondent companies were small in size, with over 60% employing fewer than forty employees in their organisations. This survey result suggests that the freight forwarding sector in Ghana is characterised by smaller companies because of a low barrier to entry; that is, the industry does not require large capital investment. This finding is in line with a similar study conducted by Lai, Ngai and Cheng (2004) on the Taiwanese freight forwarding industry. It is interesting to note that in Figure 5.2 quite a few large companies 12% (121 and above employees) exist in the freight forwarding industry in Ghana.

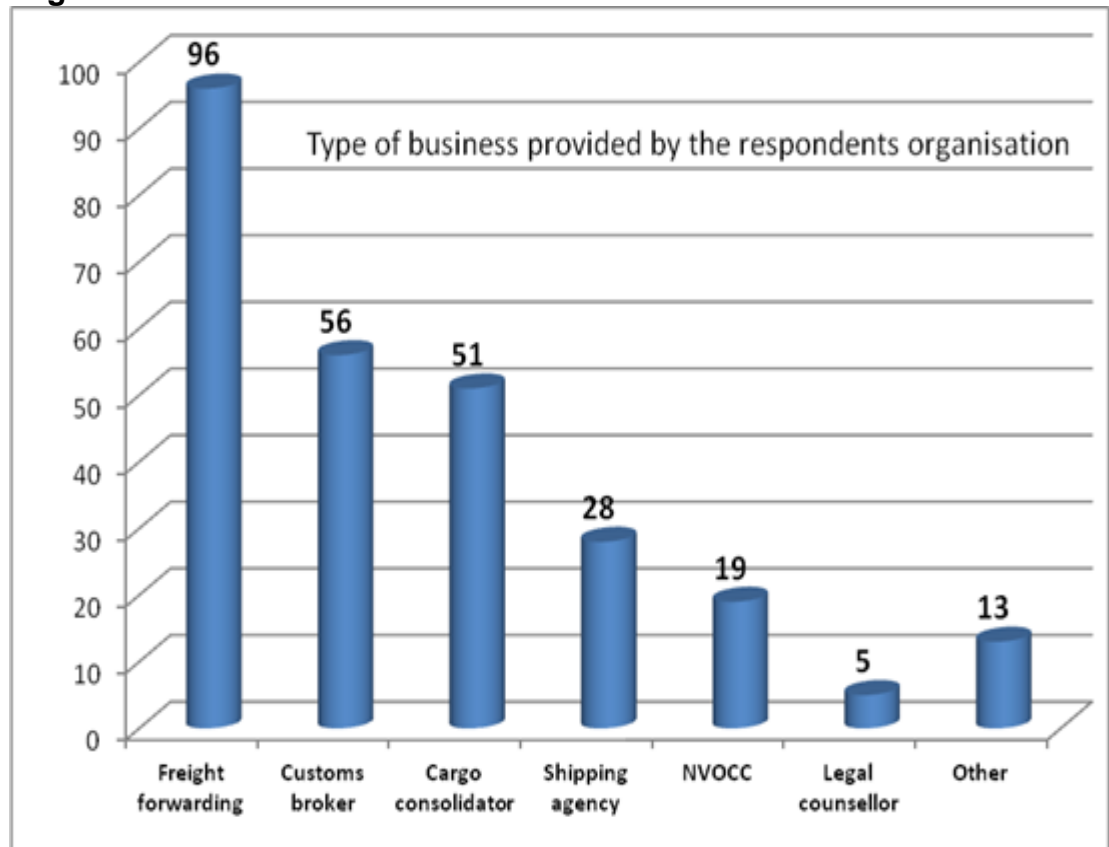
Figure 5.2: Number of Employees Working in the Respondent's Organisation



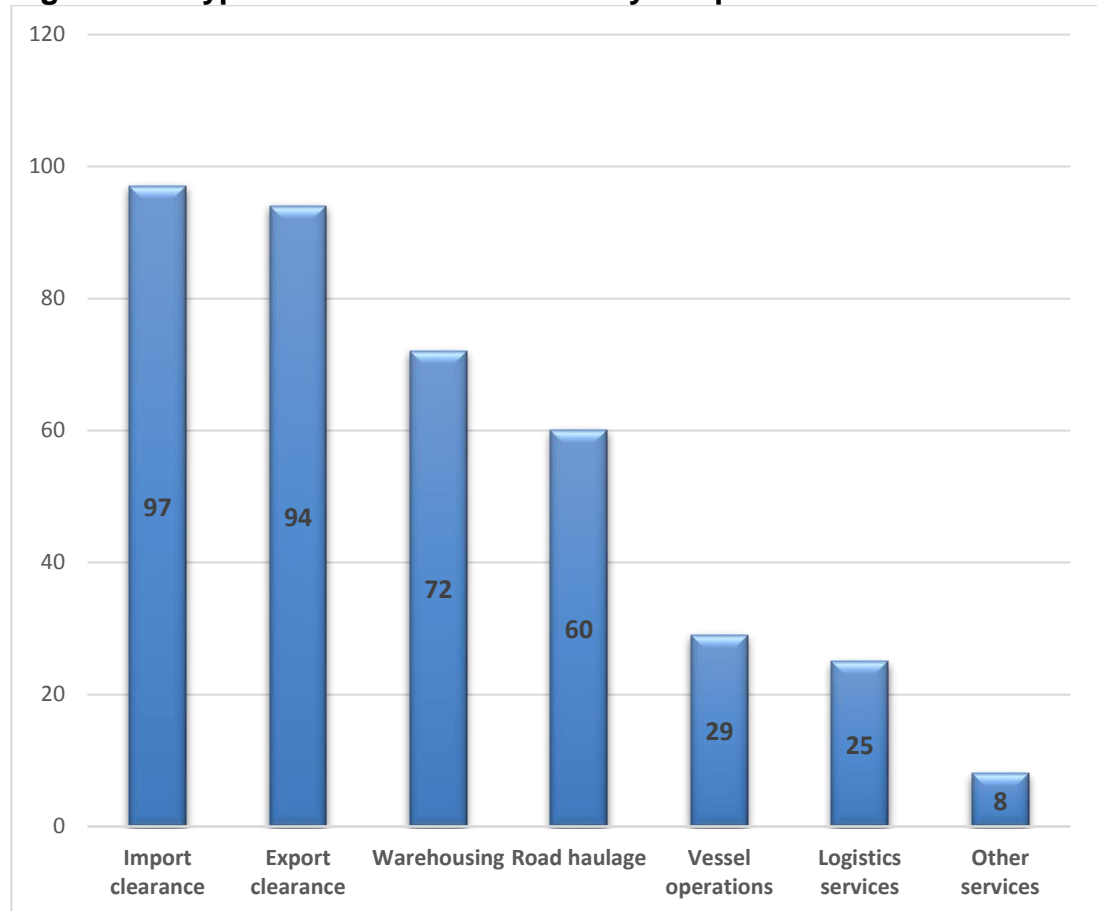
In order to know the business capability of a participating organisation, respondents were asked about the nature of their businesses. The results in Figure 5.3 show that, out of 105 respondent companies, 96 (91.4%) provided freight forwarding services, 56 (53.3%) operated as customs brokers, 51 (48.6%) were engaging in cargo consolidation, 28 (26.7%) were shipping agencies, 19 (18.1%) were NVOCC, while 5 (4.7%) operated as legal counsellors, and 13 (12.4%) were engaging in other business activities.

Thus, all respondents are directly or indirectly engaged in freight forwarding activities. Therefore, it can be said that all respondents had relevant knowledge about liner operator selection.

Figure 5.3: Type of Business Provided by the Respondent's Organisation



In order to determine the nature of services offered by the organisations, respondents were asked about the type of services provided by their organisations, and Figure 5.4 shows those results. Out of 105 respondents 97 (92%) were engaging in import clearance, 94 (89.5%) in export clearance, 72 (68.5%) in the warehousing business, 60 (57.1%) were providers of road haulage, 29 (27.6%) were engaged in vessel operations, 25 (23.8%) were providing logistics management services, while 8 (7.6%) were engaging in other services.

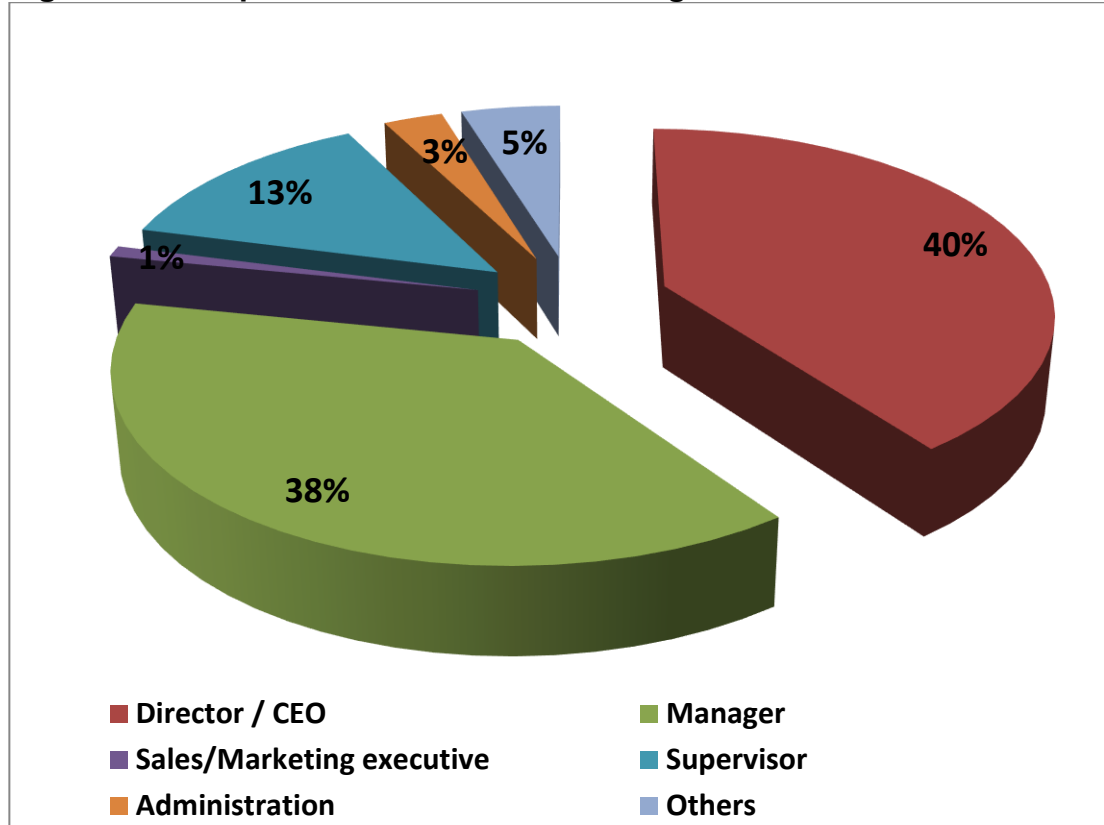
Figure 5.4: Types of Services Provided by Respondents

Import clearance was at a higher rate than export clearance, as Ghana imports more than it exports (European Commission 2014).

5.2.3 RESPONDENT PROFILES

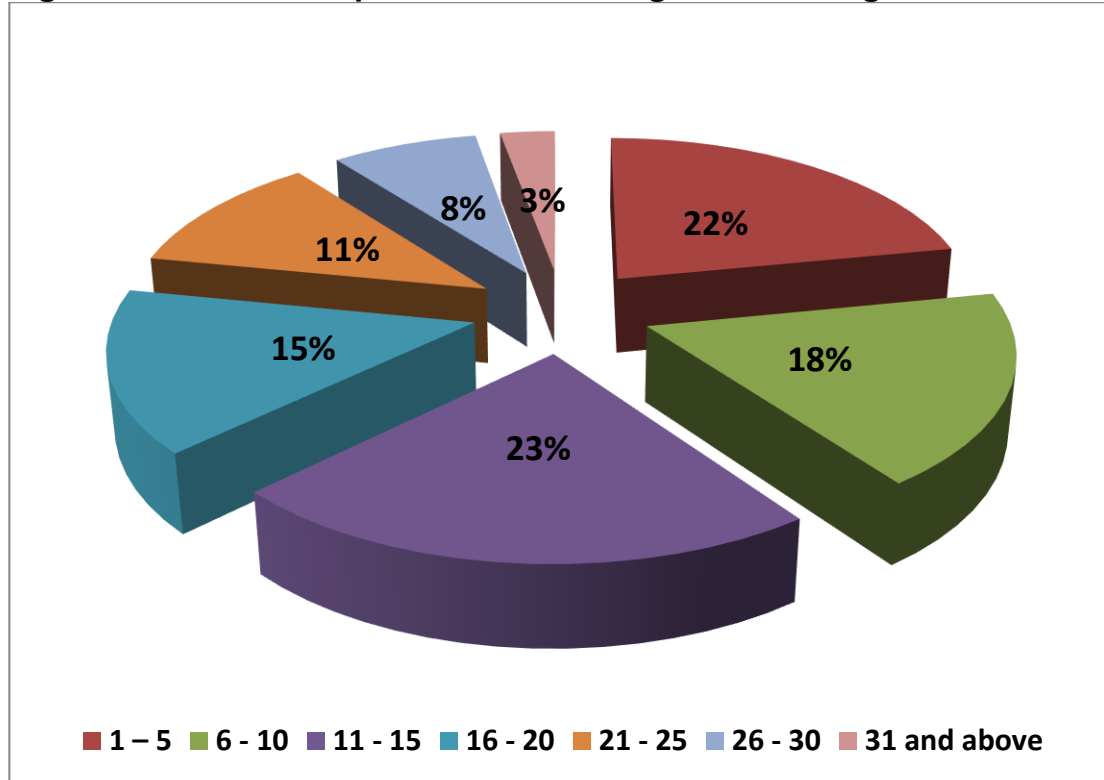
Figure 5.5 shows the profiles of survey participants by title, indicating that 40% were directors/chief executive officers (CEOs), 38% were managers, 1% was a sales executive, 13% were supervisors, 3% were administration staff and 5% represented others. This indicates, all respondents are relevant for the purpose of this research.

It is important to note that 40% were directors/chief executive officers in their organisations. In addition, 78% of respondents were working at higher management levels (directors/CEOs and managers) in their organisations and therefore, were involved in the selection of ocean container carriers.

Figure 5.5: Respondent's Position in the Organisation

The results further showed that 14% (marketing executive and supervisors) of the decision makers were of a middle management level. This indicates that the respondents would have a good operational knowledge and understanding of liner operators' selection processes in their organisation, and would be able to provide relevant answers to the survey questions. Figure 5.2 showed that over 60% of respondent organisations were small size companies, indicating one of the reasons why a large proportion (78%) of them were at higher management levels and involved in decision making about liner operators' selection process. In smaller firms, the directors/CEOs are usually directly involved in operational processes.

Figure 5.6 shows the numbers of years of experience that respondents had with regards to the selection of ocean container carriers. The data indicates that most of them have substantial experience in the freight forwarding sector, with over 75% of them having six years or more working experience in the sector.

Figure 5.6: Years of Experience in the Freight Forwarding Sector

The survey data revealed that 22% of respondents had less than six years of work experience, 18% had between six to ten years of work experience, 23% have more than ten years of experience, 15% were highly knowledgeable, with over fifteen years but less than twenty years experience, 11% had more than twenty years but less than twenty-six years, while 8% had less than thirty-one years working experience. The remaining 3% had over thirty-one years of experience in the field.

This suggests that respondents with over five years experience should have sufficient knowledge and expertise to answer the questions. The data in Figures 5.5 and 5.6 strongly suggested that the respondents had a significant role and experience in decision-making processes when managing and responding to liner operator selection in the container supply chain. Therefore, they were able to provide sufficient insights into their organisation and shipping line selection for the current study.

5.2.4 DESCRIPTIVE STATISTICS OF VARIABLES

This section reports the descriptive statistics of responses to Section B of the questionnaire, where 5-point Likert scale questions were used to obtain the participant's views on carrier selection. These were further analysed in the next section. Table 5.1 presents the feedback by respondents to the 5-point Likert scale questions on the variables that influence a freight forwarder's choice of ocean container carriers. Thirty-nine carrier selection variables were extracted based on previous studies and personal discussions with the freight forwarders and logistics experts. The survey participants were asked to rate the importance of the identified carrier selection variables using a 5-point Likert scale from 1, 'strongly disagree,' to 5, 'strongly agree'. The Likert scale questions provide data at the interval measurement level (Boone & Boone 2012; Dimitrov 2014). Thus, the data obtained from the survey will allow the use of parametric statistical tools in data analysis (Boone & Boone 2012).

Table 5.1 presents the descriptive statistics of the thirty-nine variables (the questions included in part B of the survey questionnaire) including the mean, median, standard deviation, Skewness, Kurtosis and ranked. As the responses were on a 5-point Likert scale, the median showed the trend of responses for each item for approximately 34% of responses at scale 5 (strongly agree) and the rest on scale 4 (agree). All the mean values of the responses were higher than the respective midpoint (3) of the Likert scale, indicating that respondents were well aware of the factors influencing the competitiveness of shipping lines.

It is interesting to see in Table 5.1 that variables B37 and B38, which are associated with item statements "carrier's commitment to reducing CO₂ emissions" and "carriers using renewable energy" respectively had mean values below the midpoint (3).

Table 5.1: Descriptive Statistics of Ocean Carrier Selection Variables

Item	Mean	Median	SD	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
B1 On time pick-up by shipping line	4.24	5.00	.92	-1.19	.24	0.99	.47
B2 On time delivery by shipping line	4.31	5.00	.91	-1.22	.24	0.61	.47
B3 Direct sailing (port to port)	3.99	4.00	1.18	-1.01	.24	-0.01	.47
B4 Shipping line ability to obtain berth on arrival	3.75	4.00	1.10	-0.88	.24	0.15	.47
B5 Dedicated berth by shipping line	2.81	3.00	1.39	0.11	.24	-1.30	.47
B6 Availability of door-to-door or multimodal transport services	3.09	3.00	1.25	-0.11	.24	-1.10	.47
B7 Ability to coordinate other actors, e.g. terminal operators, stevedores, etc.	3.72	4.00	1.10	-0.87	.24	0.11	.47
B8 Geographical coverage by shipping line	4.15	4.00	.96	-1.44	.24	2.15	.47
B9 Ability to provide freight and logistics services to different other types of cargo	3.70	4.00	1.12	-0.71	.24	-0.33	.47
B10 Frequency of port calls	4.21	5.00	.96	-1.33	.24	1.58	.47
B11 Transit time (port to port)	4.29	5.00	1.03	-1.64	.24	2.33	.47
B12 Competitive freight rates and charges	4.40	5.00	.89	-1.82	.24	3.58	.47
B13 Transparency of freight rates and charges	3.87	4.00	1.08	-0.93	.24	0.12	.47
B14 Simplicity of freight rates and their structure	3.67	4.00	1.01	-0.68	.24	-0.24	.47
B15 Container detention free period	4.18	4.00	1.14	-1.41	.24	1.15	.47
B16 On-time quoting of rates and charges by shipping lines	4.15	4.00	.92	-1.29	.24	1.80	.47
B17 Service schedule reliability	4.33	5.00	.91	-1.42	.24	1.63	.47
B18 On-time invoicing by the shipping line	3.85	4.00	.84	-1.41	.24	2.87	.47
B19 On-time issuing of the Bill of Lading	4.00	4.00	.90	-1.17	.24	1.70	.47
B20 On time submission of cargo manifest by shipping line	4.34	5.00	.96	-1.83	.24	3.41	.47
B21 On time release of shipping documents	4.53	5.00	.74	-1.68	.24	2.58	.47
B22 Professionalism of carriers staff	3.71	4.00	1.06	-0.74	.24	-0.18	.47
B23 Carriers staff knowledge	3.72	4.00	1.01	-0.73	.24	-0.13	.47
B24 Shipping company reputation	3.96	4.00	.88	-0.96	.24	0.93	.47
B25 Ability of carriers staff in problem solving	3.93	4.00	1.02	-1.15	.24	1.13	.47
B26 Prompt response to customers' complaints	4.26	5.00	1.05	-1.64	.24	2.25	.47
B27 Staff's politeness and courtesy to clients	3.93	4.00	.88	-1.11	.24	1.69	.47

B28 Shipping line provision of emergency services	3.17	3.00	1.29	-0.14	.24	-1.11	.47
B29 Shipping line ability to provide late hours service	3.61	4.00	1.28	-0.84	.24	-0.30	.47
B30 Quality and capacity of cargo handling facilities and equipment	4.02	4.00	.91	-1.16	.24	1.61	.47
B31 Cargo's safety management	4.12	4.00	.88	-1.21	.24	2.02	.47
B32 Cargo tracking	4.19	5.00	1.02	-1.53	.24	1.94	.47
B33 Availability of online booking	3.55	4.00	1.13	-0.60	.24	-0.65	.47
B34 On-time notice on arrival and departure information	4.25	5.00	.89	-1.70	.24	3.74	.47
B35 Accuracy of shipping documents	4.44	5.00	.84	-1.90	.24	4.47	.47
B36 Environmentally friendly operations by shipping line	3.11	3.00	1.20	-0.24	.24	-0.95	.47
B37 Carriers commitment in reducing CO2 emissions	2.89	3.00	1.19	0.21	.24	-0.80	.47
B38 Carriers' using renewable energy	2.75	3.00	1.13	0.26	.24	-0.74	.47
B39 Corporate social responsibility by shipping line	3.43	4.00	1.08	-0.64	.24	-0.18	.47
Average	3.86	4.15	1.03	-1.02	.24	0.99	.47

Note: 1 = strongly disagree, 5 = strongly agree.
SD = standard deviation.

The respondents did not consider the aforementioned items important even though environmental issues are drawing the attention of maritime stakeholders and policy makers and as a result, forcing governments and international bodies to enact more stringent environmental regulations to reduce CO₂ emissions from ships (Eide et al. 2011).

Environmental issues, especially global warming have become hot issues among maritime stakeholders in the maritime industry.

The standard deviations of items were within a range of between 0.74 and 1.28 which shows the parametric nature of the data set, suggesting the suitability of the data for factor analysis (Meeker & Escobar 2014; Pallant 2013). Table 5.1 shows the overall average of perspectives on the factors important to ocean container carrier selection as 3.86, suggesting a high level of awareness among respondents to the questions being asked by the survey about factors influencing ocean container carrier selection. The data in Table 5.1 showed that approximately 50% of the items have a mean value of above 4, which suggests that 50% of the items have a strong effect on ocean container carrier selection.

Table 5.2 presents the importance ratings of carrier selection variable by respondents including the ranking, mean, median and standard deviation of each variable. The freight forwarders attached a high level of importance to on time release of shipping documents, accuracy of shipping documents and competitive freight rates and charges. It is interesting to note that the freight forwarders awarded the 'strongly agree' and the 'agree' ratings to almost half of the selection variables. These variables are:

- 1) On time release of shipping documents
- 2) Accuracy of shipping documents
- 3) Competitive freight rates and charges
- 4) On time submission of cargo manifest by the shipping line
- 5) Service schedule reliability
- 6) On time delivery by the shipping line

- 7) Transit time (port to port)
- 8) Prompt response to customer complaints
- 9) On time notice on arrival and departure information
- 10) On time pickup by the shipping line
- 11) Frequency of port calls
- 12) Cargo tracking
- 13) Container detention free period
- 14) On time quoting of rates and charges by shipping lines
- 15) Geographical coverage by the shipping line
- 16) Cargo's safety management
- 17) Quality and capacity of cargo handling facilities and equipment
- 18) On time issuing of the Bill of Lading

On time release of shipping documents had the highest rating according to the freight forwarders. It is of no surprise that on time release of shipping documents received the highest rating from the respondents because freight forwarders work closely to meet the just-in-time deadlines of their clients (Vermeiren & Macharis 2016). The freight forwarders are concerned about liner shipping companies on-time release of shipping documents such as a bill of lading and delivery order so that they can finalise customs clearance processes and take delivery of goods without delay. More specifically with the increasing demand of e-commerce and its association of the issuing of electronic bill of lading and telex release, it is not surprising that on time release of shipping documents become very important to freight forwarders.

The accuracy of shipping documents was rated as the second highest selection variable by survey respondents. The respondents considered the accuracy of shipping documents relevant due to the time sensitivity of shipping documents. An error on shipping documents could bring a halt to the production line and can also result in enormous penalties as incorrect documents can be regarded as falsified documents.

Table 5.2: Importance of Carrier Selection Variables

	Ranking	Mean	Median	SD
Item statements				
B21: On time release of shipping documents	1	4.53	5.00	.74
B35: Accuracy of shipping documents	2	4.44	5.00	.84
B12: Competitive freight rates and charges	3	4.40	5.00	.89
B20: On time submission of cargo manifest by the shipping line	4	4.34	5.00	.96
B17: Service schedule reliability	5	4.33	5.00	.91
B2: On-time delivery by the shipping line	6	4.31	5.00	.91
B11: Transit time (port to port)	7	4.29	5.00	1.03
B26: Prompt response to customer complaints	8	4.26	5.00	1.05
B34: On-time notice of arrival and departure information	9	4.25	5.00	.89
B1: On-time pick-up by the shipping line	10	4.24	5.00	.92
B10: Frequency of port calls	11	4.21	5.00	.96
B32: Cargo tracking	12	4.19	5.00	1.02
B15: Container detention free period	13	4.18	4.00	1.14
B16: On-time quoting of rates and charges by the shipping lines	14	4.15	4.00	.92
B8: Geographical coverage by the shipping line	15	4.15	4.00	.96
B31: Cargo's safety management	16	4.12	4.00	.88
B30: Quality and capacity of cargo handling facilities and equipment	17	4.02	4.00	.91
B19: On-time issuing of the Bill of Lading	18	4.00	4.00	.90
B3: Direct sailing (port to port)	19	3.99	4.00	1.18
B24: Shipping company's reputation	20	3.96	4.00	.88
B27: Staff politeness and courtesy to clients	21	3.93	4.00	.88
B25: Ability of carrier staff to problem-solve	22	3.93	4.00	1.02
B13: Transparency of freight rates and charges	23	3.87	4.00	1.08
B18: On-time invoicing by the shipping line	24	3.85	4.00	.84
B4: Shipping line's ability to obtain berth on arrival	25	3.75	4.00	1.10

B23: Carrier staff knowledge	26	3.72	4.00	1.01
B7: Ability to coordinate other actors, e.g. terminal operators, stevedores, etc.	27	3.72	4.00	1.10
B22: Professionalism of carrier staff	28	3.71	4.00	1.06
B9: Ability to provide freight and logistics services to different other types of cargo	29	3.70	4.00	1.12
B14: Simplicity of freight rates and their structure	30	3.67	4.00	1.01
B29: Shipping line's ability to provide late hours service	31	3.61	4.00	1.28
B33: Availability of online booking	32	3.55	4.00	1.13
B39: Corporate social responsibility by the shipping line	33	3.43	4.00	1.08
B28: Shipping line's provision of emergency services	34	3.17	3.00	1.29
B36: Environmentally friendly operations by the shipping line	35	3.11	3.00	1.20
B6: Availability of door-to-door or multimodal transport services	36	3.09	3.00	1.25
B37: Carrier's commitment to reducing CO ₂ emissions	37	2.89	3.00	1.19
B5: Dedicated berth by shipping line	38	2.81	3.00	1.39
B38: Carriers using renewable energy	39	2.75	3.00	1.13
Average		3.86	4.15	1.03

Note: 1 = strongly disagree, 5 = strongly agree.
SD = standard deviation.

It is interesting to note that the high importance attributed by the respondents to the accuracy of shipping documents is consistent with previous studies (Lu 2003b, 2007; Voss et al. 2006).

According to Wen and Huang (2007) the accuracy of shipping documents is important to freight forwarders in their decision making about ocean container carriers. For example, an error free bill of lading helps in quick documentation processes, especially in online shipment processes.

An important finding is that the freight forwarders did not rank the freight rate as the most influential selection variable, which is in line with the findings of D'este and Meyrick (1992) and Huang and Hsu (2016), that freight forwarders are service-oriented rather than price driven in their decision-making about liner operators.

5.3 FACTOR ANALYSIS

This section reports the results of Exploratory Factor Analysis (EFA) of the influential factors affecting freight forwarders' selection of liner operators.

As explained in Chapter 4, exploratory factor analysis (EFA) is applied using Principal Components Analysis (PCA). EFA provides an opportunity to explore the factor structure of a set of observed variables without imposing a predefined structure on the outcome (Suhr 2006). As a result, EFA has been used to evaluate the conceptual framework model introduced in Chapter 3. The EFA was based on the 39 items designed in Section B of the survey questionnaire to achieve a better factor structure.

According to Pallant (2013), Williams, Brown and Onsman (2013) and Yong and Pearce (2013) there are five key issues that need to be carefully considered when conducting factor analysis. The following five key issues of factor analysis are discussed in detail:

- assessing the suitability of the data for factor analysis,
- the extraction method,

- deciding on the criteria for the extraction of factors,
- selection of rotational method and
- interpretation and labelling of factors.

The first important step in factor analysis is evaluating the suitability of the dataset (Gaskin 2013a; Pallant 2013). There are various schools of thought on necessary sample requirements, including sample size, strength of inter-correlation among variables, Bartlett's Test of Sphericity and the Kaiser-Mayer-Olkin index. However, various ratios of participants to the number of factors have been widely used in EFA, that is, 3:1, 6:1, 10:1, 15:1 & 20:1. A preferable one is 5:1 (Williams, Brown & Onsman 2013). Six factors are considered by the current study with two or more items in each factor, therefore, meeting the requirements of the assumption.

The strength of inter-correlation among items is another method used by researchers. The correlation co-efficient among items may be +/-0.3 (minimum), +/-0.4 (important), and +/-0.5 (significant). The correlation co-efficient among variables for the present study lies moderately at 0.4. There are several correlations among items above 0.4 (see Table E-4 Appendix E), indicating strength and suitability of data for factor analysis.

Bartlett's Test of Sphericity should be significant at $p < 0.05$ which denotes a sufficient correlation among items to support a rational basis for factor analysis (Gaskin 2013b; Minckler 2011). The Bartlett's Test of Sphericity for this present study is significant at $p < .000$ (see Table 5.3), which also suggests the suitability of the data for EFA.

The Kaiser-Mayer-Olkin (KMO) index should have a value range from 0 to 1. Values greater than 0.9 are (marvellous), 0.8-0.9 (meritorious), 0.7-0.8 (middling), 0.6-0.7 (mediocre), 0.5-0.6 (miserable) and < 0.5 are (unacceptable) (Loxton 2015). However, Williams, Brown and Onsman (2013) considered 0.6 better for factor analysis. The KMO index for the current study is 0.878 (Table 5.3) which is larger than the recommended

value of 0.60, suggesting the data for the study meets the suitability requirements.

Missing data was checked, and there was none found to missing as shown in the case processing summary (see Table E-1) in Appendix E. Data screening was conducted in Excel for unengaged responses and two responses were detected as unengaged with a standard deviation value of .22 with no variance, which means that the respondents answered all the questions in the same way, and thus shows no engagement in the questions in the answers. These two responses were removed from the dataset.

Regarding the extraction method, as Williams, Brown and Onsman (2013) noted, the method of Principal Component Analysis (PCA) is the default method in many statistical programs and is most commonly used in EFA. To derive an appropriate number of factors that best fit the data set, this study applied PCA, as it was preferred over other methods such as unweighted least squares, generalised least squares, maximum likelihood, principal axis factoring, alpha factoring, and image factoring (Gaskin 2013a; Meeker & Escobar 2014; Pallant 2011; Tabachnick & Fidell 2007; Yong & Pearce 2013).

To decide the number of common factors, this study used the Kaiser criterion (the eigenvalues of the correlation matrix being greater than 1). In addition, the number of factors was also chosen to ensure that they explained more than 60% of the cumulative variance (Byrne 2013; Hair et al. 2010; Roval, Baker & Ponton 2013; Yong & Pearce 2013).

This study applied the Oblique (Oblimin) rotation technique, given the fact that there is no widely preferred method of factor rotation, and all tend to produce similar results (Abdi 2003; Fabrigar et al. 1999). The aim of rotation is to attain a simple optimal structure which attempts to have each variable load on as few components (factors) as possible and to reduce ambiguity (Williams, Brown & Onsman 2013; Yong & Pearce 2013). According to

Williams, Brown and Onsman (2013) oblique rotation produces factors that are correlated, which often produces more accurate results.

Factor loadings are important in determining the strength of relationships when interpreting the factors (Yong & Pearce 2013). This study sets a significant loading cut-off to make interpretation easier, and to reduce the number of cross-loadings. Labelling is carried out to operationalise the factors which reflect the theoretical and conceptual intent (Williams, Brown & Onsman 2013). The components (factors) were named based on the themes covered by their respective variables. Extra measures were taken in naming the components to ensure that the labels or constructs reflected the theoretical and conceptual intent.

As mentioned earlier, this study conducted tests of sampling adequacy and sphericity before undertaking exploratory factor analysis. The sampling adequacy test had the Kaiser-Meyer-Olkin measure of sampling adequacy at 0.878 above the recommended better value of (.60). Thus, the data of this present study meets sampling adequacy. Similarly, the Chi-Square statistic of Bartlett's Test of Sphericity is 3154.83 see Table 5.3. Therefore, the null hypothesis that the correlation matrix is an identity matrix is rejected.

Table 5.3: KMO And Bartlett's Test (Initial Run)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.878
Bartlett's Test of Sphericity	Approx. Chi-Square	3154.826
	df	741
	Sig.	.000

To obtain the number of components, the initial run elicited eight components with eigenvalues exceeding 1 (i.e. Kaiser criterion), explaining 41.32%, 10.42%, 5.45%, 3.99%, 3.56%, 3.15%, 2.77% and 2.57% of the variance respectively. The total percentage of cumulative variance explained by the eight factors was 73.25% (see Table 5.4).

In order to have a final clear factor solution during the final analysis of the EFA, the study adhered to guidelines recommended by researchers, that is,

that components with items loading two or more and with loading > .60 be retained (Costello & Osborne 2005; Gaskin 2013a; Loxton 2015; Yong & Pearce 2013). The final analysis of the EFA retained six factors.

Table 5.4: Total Variance Explained – EFA with 8 Factors

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	16.115	41.321	41.321	7.699	19.740	19.740
2	4.065	10.422	51.743	4.158	10.662	30.402
3	2.127	5.454	57.197	4.103	10.520	40.922
4	1.558	3.994	61.191	3.896	9.991	50.913
5	1.390	3.564	64.755	2.837	7.273	58.186
6	1.229	3.151	67.907	2.276	5.837	64.023
7	1.081	2.773	70.680	1.799	4.614	68.637
8	1.002	2.569	73.249	1.798	4.612	73.249
9	.895	2.295	75.544			
.	.	.	.			
.	.	.	.			
39	.041	.106	100.000			

Extraction Method: Principal Component Analysis.

Table 5.5: Total Variance Explained (6 Factor Model)

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.142	41.870	41.870	6.692	23.077	23.077
2	3.302	11.385	53.255	3.557	12.267	35.343
3	1.684	5.806	59.060	2.958	10.200	45.544
4	1.345	4.638	63.699	2.856	9.848	55.392
5	1.158	3.993	67.691	2.656	9.160	64.552
6	1.070	3.691	71.382	1.981	6.830	71.382
.	.780	2.690	74.072			
.	.	.	.			
39	.064	.220	100.000			

Extraction Method: Principal Component Analysis.

Table 5.5 reports the rotated, total variance explained after the six components rotation of factors which are influential to liner operators' selection. The six components (factors) explained 71% of the cumulative variance. The first component accounted for 41.9%, the second component for 11.4%, the third component contributed 5.8%, the fourth component for 4.6%, the fifth component contributed 4.0% and the sixth component accounted for 3.7%.

Cronbach's Alpha coefficient was used to test the reliability test as recommended by Bonett and Wright (2015) and Botella and Suero (2015). The Cronbach's Alpha coefficient values for each of the 6 components concerning ocean container carrier selection were 0.741, 0.899, 0.746, 0.698, 0.680 and 0.791 respectively (see Table 5.6). Thus indicating a relatively high level of reliability among variables, denoting that the identified variables are strongly measuring the same construct.

Table 5.6 presents the rotated pattern matrix of the six factors in EFA, indicating a simple structure, with each item loading high on only one of the six factors.

The convergent validity of EFA was conducted to ensure that the component loadings of all items were $>.5$, being highly correlated with the concerned factor.

The six components (factors) contained 16 items with factor loadings above 0.6. As indicated in (Table 5.6), the first factor, '*service quality*' contained items B28, B22, and B23 with associated item statements being 'shipping line provision of emergency service', 'professionalism of shipping line staff', and 'shipping line staff knowledge', respectively. The service quality factor accounted for 41.9% of the total variance of variable 'shipping line provision of emergency services' with the factor loading of (.727).

All of the items under this factor focused on service delivery and the good knowledge of ocean container carriers on the services provided to freight forwarders. Therefore, the factor was named '*service quality*'. The substantial loading of items on this factor indicated that service quality of the liner shipping companies is influenced by the knowledgeability of the ocean carriers staff about services provided to freight forwarders. The ocean container carrier's ability to provide emergency services of late booking and loading/offloading in urgent situations was critical to the freight forwarders.

The second factor, '*environment*' consisted of items B38, B37 and B36, with corresponding item statements of whether carriers used renewable energy or not, their commitment to reducing CO₂ emissions, and environmentally friendly operations by the shipping line respectively. The environment factor accounts for 11.4% of the total variance with 'carriers using renewable energy' having the highest factor loading (.949) for this factor. This factor was labelled 'environment' because all the items under it focused on environmental issues.

The high loading of all the items under this factor indicated that ocean container carriers should pay more attention to environmental issues, as global warming is drawing the attention of maritime stakeholders. Freight forwarders are gradually engaging with the environmental debate, therefore it is clear that considering environmental issues is important for them when selecting an ocean container carrier.

The third factor, '*schedule reliability*' comprised of items B10, B32 and B18, with associated item statements being frequency of port calls, cargo tracking and on-time invoicing by the shipping line respectively. All the items under this factor focused on the ocean container carrier's ability to provide scheduled service frequently between ports, and the reliability of tracking cargo within the container supply chain. Hence, the factor was named 'schedule reliability'.

The schedule reliability factor accounted for 5.8% of the total variance with 'frequency of port calls' having the highest factor loading (.730) for this factor. The result indicated that freight forwarders considered an ocean container carrier's ability to call port to port frequently with a reliable cargo tracking system and on-time issuing of shipping documents as critical elements when choosing an ocean container carrier.

The fourth factor, '*Quick handling*' is associated with questions B6 and B5 which covered question statements about the availability of door-to-door or multimodal transport services, and dedicated berth by the shipping line

respectively. The factor was named quick handling because the items under it focused on the liner shipping company's ability to berth on-time and transfer cargo quickly from the maritime mode to hinterland transports without delay.

Table 5.6: Six Components Rotated - Pattern Matrix^a

Items	Component					
	Service Quality	Environment	Schedules	Quick Handling	Freight Rates	Documentation
Cronbach's Alpha	.741	.899	.746	.589	.680	.791
Shipping line's provision of emergency services	.727	.068	.098	.064	-.069	.002
Professionalism of carrier staff	.715	.078	.028	.014	.102	.131
Carrier's staff knowledge	.602	.178	-.010	-.059	.251	.112
Carriers using renewable energy	-.058	.949	-.023	-.004	.048	-.033
Carrier's commitment to reducing CO2 emissions	.036	.885	.011	.062	.059	-.015
Environmentally friendly operations by the shipping line	.163	.810	-.009	.069	-.112	.026
Frequency of port calls	-.128	-.068	.730	-.021	.211	.180
Cargo tracking	.053	.340	.681	-.024	.046	.074
On-time invoicing by the shipping line	.309	-.137	.679	.161	.054	-.075
Availability of door-to-door or multimodal transport services	-.221	.196	.149	.838	-.057	.097
Dedicated berth by the shipping line	.355	-.060	-.165	.727	.176	-.063
transparency of freight rates and charges	-.087	-.049	.100	.079	.849	.073
Simplicity of freight rates and their structure	.258	.116	.072	-.031	.686	-.006
Accuracy of shipping documents	-.039	.005	-.180	.030	.107	.917
On-time quoting of rates and charges by the shipping line	.246	-.058	.218	.070	-.194	.698
Service schedule reliability	.013	.041	.291	-.068	.121	.662

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 13 iterations.

The quick handling factor accounted for 4.6% of the total variance with 'availability of door-to-door or multimodal transport services' having the highest factor loading (.838). This suggests that the liner shipping company's capability to offer a door-to-door multimodal transport service for easy

handling and a seamless transfer of cargo from one mode to another is critical to their competitiveness. Freight forwarders considered the shipping company's ability to provide dedicated berth or to berth on arrival as important. Dedicated berth enables ships to berth upon arrival for quick offloading and loading.

The fifth factor was the '*freight rate*' is represented by questions B13 and B14 with the corresponding question statements being transparency of freight rates and charges, and the simplicity of freight rates and their structure. The items under this factor focused on the ocean container carrier's capability to offer flexible freight rates. Consequently, the factor was labelled '*freight rate*'.

The freight rate factor accounted for 4.0% of total variance with 'transparency of freight rates and charges', having the highest factor loading (.849) for this factor. The high loading of items under it indicated that survey respondents considered freight rate to be an influential factor in their selection of ocean container carriers.

This suggests that liner shipping companies should take note of the composition of their freight rates. The freight rate structure should be simple and transparent with every single component of it itemised so as to ease interpretation and understanding for freight forwarders. The high loadings of items under this factor indicated that the respondents do not appreciate lumpsum freight rates which are an all inclusive rate without itemisation of the elements of the total freight. Freight forwarders preferred transparency in freight rates because they have to explain the elements of the total freight rate to their customers (cargo owners).

Finally, the sixth factor, '*document accuracy*' consisted of items B35, B16 and B17 with associated question statements being accuracy of shipping documents, on-time quoting of rates and charges by the shipping line, and shipping service schedule reliability. All the items under this factor focused on the accuracy and timely processing of error free shipping documents by ocean container carriers. Hence, the factor was labelled document accuracy.

The document accuracy factor accounted for 3.7% of the total variance with 'accuracy of shipping documents' having the highest factor loading (.917) for this factor. This shows that survey respondents considered documentation related issues very crucial when choosing an ocean container carrier to transport their client's cargo. The liner shipping company's ability to provide accurate shipping documents without any error on shipping related documents is a key factor that has a significant impact on the competitiveness of the ocean container carriers from the freight forwarder's perspective.

5.4 CONFIRMATORY FACTOR ANALYSIS

In this section, confirmatory factor analysis (CFA) is conducted to further analyse and confirm the relationship among the six components (factors) identified in the exploratory factor analysis (EFA) presented in the previous section.

Analyses were conducted to test for CFA assumptions before proceeding with the CFA. The confirmatory factor analysis began with model fit using the statistical package for the social sciences (SPSS) based on the AMOS Graphics version 22 of structural equation modelling (SEM) so as to ensure that the model developed out of the EFA was a good fit to the data.

Researchers have various views on model fit indicators and there is no consensus on best fit indices to provide accurate information on fit indices to the data (Carvalho et al. 2013; Marsh, Balla & McDonald 1988; O'Rourke, Psych & Hatcher 2013). For example, Opperman, Benson and Milhausen (2013) and Kline (2015) recommend fit indices such as the Goodness-of-Fit Index (GFI), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA).

The study of Saleh (2006) stipulated that the Minimum Discrepancy/Degrees of Freedom (CMIN/DF), Incremental Fit Index (IFI), TLI, CFI, and RMSEA are the best fit indices. Minimum Discrepancy/Degrees of Freedom (CMIN/DF), Adjusted Goodness-of-Fit Index (AGFI), GFI, CFI, Parsimony-adjusted CFI

(PCFI), Test of statistical significance for RMSEA (PCLOSE) and RMSEA are good measures of fit indices recommended by Gaskin (2013c) for evaluating model fit.

However, Byrne (2013) favours Root Mean Square Residual (RMR), GFI, AGFI and PGFI or a non-significant chi-square index and critical ration scores lower than 1.96 as an indication for a good fit of the model to the data. Having considered the frequent usage of fit indices in social sciences and transport logistics literature, this study reports a range of fit indices for model fit as recommended by researchers (see for example Allen Bennett & Heritage 2014; Brown 2015; Byrne 2013; Gaskin 2013c; Opperman, Benson & Milhausen 2013; Shek & Yu 2014). Table 5.7 shows the summary of fit measures recommended by researchers.

This study also conducted a curve estimation for all the relationships in the model, and the results suggested that all relationships were sufficiently linear. Linear relationships among variables were good with the F value at 2.74 and P value significant at 0.10, indicating the data are sufficiently linear to be tested in a structural equation model see Table F-1 Appendix F.

Table 5.7: Summary of SEM Model Fit Measure Acceptable Levels

			Index						
	CMIN/DF	p-value	GFI	AGFI	IFI	TLI	CFI	PCLOSE	RMSEA
Acceptable Level	≤ 3	>.05	>.90 but .80 is tolerable	>.90 but anything between .70-.80 is tolerable	>.90	>.95	>.90	>.05	<.05 good
Source: Adopted from Gaskin (2013c), Byrne (2013) and Loxton (2015)									

A good model was obtained for the current study by inputting the finalised pattern matrix (Table 5.6) obtained from EFA into AMOS graphics using plugins pattern matrix model builder. Figure F-1 (Appendix F) reports the initial run of the path diagram with unstandardized estimates of CFA, which revealed the estimates of the variances among the six factors. The assumptions of CFA were met, and the study proceeded with the analysis.

Table 5.8: Standardized Regression Weights

Item Description			Factors	Estimate
B28	Shipping line provision of emergency services	<---	Service quality	0.598
B22	Professionalism of shipping line staff	<---	Service quality	0.778
B23	Shipping line staff's knowledge	<---	Service quality	0.772
B38	Shipping lines using renewable energy	<---	Environment	0.895
B37	Shipping lines commitment to reducing CO2 emissions	<---	Environment	0.950
B36	Environmentally friendly operations by the shipping lines	<---	Environment	0.758
B10	Frequency of port calls	<---	Scheduling	0.695
B32	Cargo tracking	<---	Scheduling	0.777
B18	On-time invoicing by the shipping line	<---	Scheduling	0.641
B6	Availability of door-to-door or multimodal transport service	<---	Handling	0.549
B5	Dedicated berth by the shipping line	<---	Handling	0.764
B13	Transparency of freight rates and charges	<---	Freight rate	0.641
B14	Simplicity of freight rates and their structure	<---	Freight rate	0.805
B35	Accuracy of shipping documents	<---	Documentation	0.617
B16	On-time quoting of rates and charges by shipping lines	<---	Documentation	0.722
B17	Service schedule reliability	<---	Documentation	0.898

Figure 5.7 shows the correlation relationships between the underlying factors of liner operators' competitiveness with the standard estimates of regression coefficients respectively. Correlations indicated the relationships between the factors; the relationship between variables is indicated by covariance estimates and squared multiple correlations (SMC) explaining the variance of the items.

The results of Table 5.9 suggest a good model fit: with CMIN/DF = 1.24 and P=0.061 indicating that this study was P>.05. Therefore, the hypothesis that the model is an exact fit to the data is tenable. GFI = .88, CFI = .97, RMSEA = .049, and PCLOSE = .51. The factor loadings for all of the factors were statistically significant (p<.001) and ranged from .55 to .95, with an average factor loading of .74 (see Table 5.8).

The correlation among the factors ranged from .22 to .78, with an average correlation value of .50. All correlations were statistically significant (p<.05) (see Table F-2 Appendix F). The SMC ranged from .30 to .90, with an average SMC of .56 (see Appendix F-4), indicating that, on average, 56% of the variance in the items was accounted for by the latent factors of service,

environment, scheduling reliability, quick handling, freight rates and documentation accuracy.

Figure 5.7: Path Diagram with Standardized Estimates for all Relationships

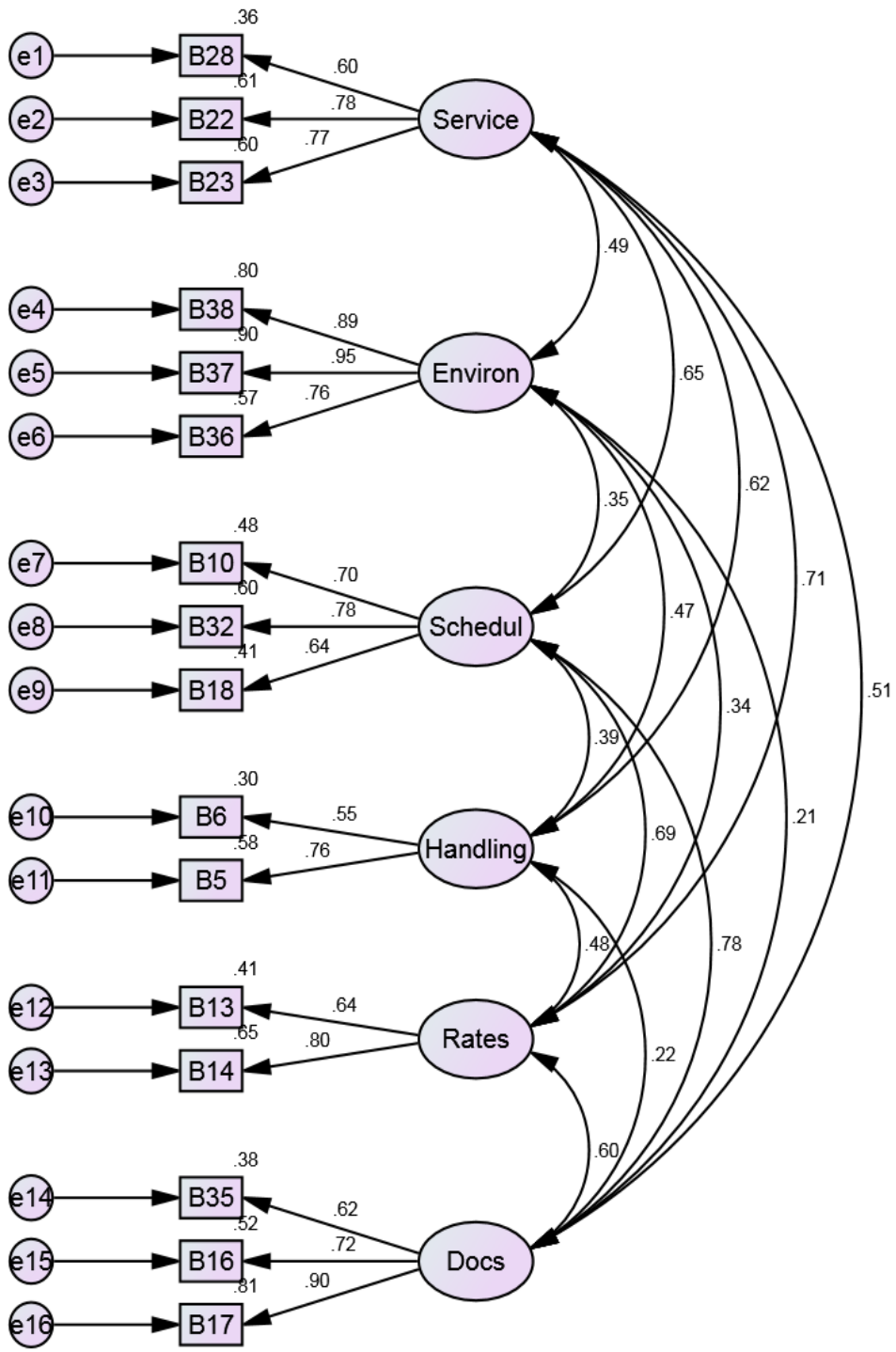


Table 5.9: Model Fit Summary**CMIN**

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	47	110.513	89	0.061	1.242
Saturated model	136	0	0		
Independence model	16	797.523	120	0	6.646

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	0.078	0.883	0.822	0.578
Saturated model	0	1		
Independence model	0.368	0.362	0.277	0.32

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	0.861	0.813	0.97	0.957	0.968
Saturated model	1		1		1
Independence model	0	0	0	0	0

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0.049	0	0.076	0.51
Independence model	0.235	0.22	0.251	0

The relationship between the variables, as indicated by the covariance estimates, indicated a relationship between service quality and other factors including environment, schedule reliability, quick handling and freight rate. Furthermore, the environment is related to schedule reliability, quick handling, freight rate and documentation. Likewise, schedule reliability is related to quick handling, freight rate and documentation. The results reported in Table 5.10 indicate that all variables are significant at a 1% level. Table 5.10 revealed that all the variables in this model were significant with their value within the tolerable ranges as shown in Table 5.8, that is, RMSEA, CMIN/DF and PCLOSE, indicating that the RMSEA point estimate of < 0.05, with a 90% confidence interval ranging from lower (0.000) to upper bounds (0.76), and the probability associated with the test of close is > 0.50, therefore it can be concluded that the resultant model fits the data well.

Table 5.10: Regression Weights

	Factors	Estimate	S.E.	C.R.	P
B28 Shipping line provision of emergency services	<--- Service quality	1.000			
B22 Professionalism of shipping line staff	<--- Service quality	1.069	.191	5.612	***
B23 Shipping line staff's knowledge	<--- Service quality	1.012	.181	5.592	***
B38 Shipping line's use of renewable energy	<--- Environment	1.000			
B37 Shipping line's commitment to reducing CO2 emissions	<--- Environment	1.119	.084	13.376	***
B36 Environmentally friendly operations by shipping lines	<--- Environment	.906	.094	9.669	***
B10 Frequency of port calls	<--- Scheduling	1.000			
B32 Cargo tracking	<--- Scheduling	1.192	.182	6.540	***
B18 On-time invoicing by the shipping line	<--- Scheduling	.813	.145	5.606	***
B6 Availability of door-to-door or multimodal transport service	<--- Handling	1.000			
B5 Dedicated berth by shipping line	<--- Handling	1.547	.431	3.593	***
B13 Transparency of freight rates and charges	<--- Rates	1.000			
B14 Simplicity of freight rates and their structure	<--- Rates	1.176	.220	5.337	***
B35 Accuracy of shipping documents	<--- Documentation	1.000			
B16 On-time quoting of rates and charges by shipping lines	<--- Documentation	1.291	.222	5.808	***
B17 Service schedule reliability	<--- Documentation	1.587	.250	6.337	***

The common validity measures employed by researchers to examine data in CFA includes discriminant validity and convergent validity (Byrne 2013; Campbell and Fiske 1959; Gaskin 2013c). The reliability measures of CFA include composite reliability, average variance extracted (AVE), maximum shared variance (MSV), and average shared variance (ASV). However, the one most commonly reported in the literature is composite reliability and AVE (Gaskin 2013c). Thus, this study reported composite reliability and AVE.

Validation and reliability of the model were conducted using Validity Master in the Excel stats tool package. The correlations and standardised regression weights tables generated in AMOS (Table F-2 and Table F-3 Appendix F) respectively were inserted into the validity master of the stats tools package to obtain reliability and validity of CFA (see Table 5.11). The acceptable reliability level for composite reliability is $>.70$ and CR must be greater than AVE for convergent validity while the threshold for AVE is > 0.5 (Gaskin 2013c, 2016; Hair et al. 2010).

Table 5.11: Reliability and Validation of Six Factors

	CR	AVE	Rates	Service	Environ	Scheduling	Handling	Documentation
Freight Rate	0.710	0.529	0.728					
Service Quality	0.762	0.520	0.714	0.721				
Environment	0.904	0.759	0.345	0.495	0.871			
Scheduling	0.748	0.510	0.692	0.649	0.349	0.706		
Handling	0.607	0.443	0.484	0.618	0.471	0.390	0.665	
Documentation	0.795	0.569	0.603	0.511	0.211	0.785	0.219	0.755

Table 5.11 shows the results of reliability and validity measures which suggest there is no discriminant validity issue among the factors. The composite reliability values for the factors were all above 0.70, indicating that the validity among factors was supported and the model performed well. However, composite reliability for handling was less than 0.70. The convergent validity of the factors was good with each composite reliability value greater than its corresponding average variance extracted (AVE). The square root of the AVE for all the factors was greater than 0.5 with the exception of AVE for handling which was less than one absolute value (.500). Thus, the model performs well on the factors examined for discriminant validity.

In order to assess whether AVE can be improved, further EFA analysis was carried out on two factors, namely scheduling and documentation, to see which items had strong cross loading between them because of the 0.78 high correlations (see Figure 5.7). The EFA result indicated that there was no strong cross loading between these factors (see Table E-5 Appendix E).

However, item B18 (on-time invoicing by the shipping line) and B16 (the shipping line quoting freight rates and charges on time) were deleted from scheduling and documentation respectively in the CFA to see if AVE can be improved (see Figure 5.8). The composite reliability and AVE were re-computed using the stats tools package in excel, and there was a slight

increase in composite reliability for handling but it did not meet the threshold of 0.70, and AVE for handling also did not meet the threshold of 0.50.

Figure 5.8 shows the path diagram for the two items deleted and there were no significant changes in factor loadings and factor covariance. The degree of freedom between factors did not improve by double. According to researchers, the degree of freedom must double to enable a researcher to accept the new model. Thus, the two item deletion model (Figure 5.8 model two) was rejected and so this study accepted the initial six-factor model (Figure 5.7) as a good fit model.

Next, in order to determine the most important path in the model, a second-order model was conducted (see Figure 5.9) based on the accepted six-factor model. The fit of the second-order model can be statistically tested so long as four or more first order factors are hypothesised (Chen, West & Sousa 2006). There was a slight increment in some of the fit indices and a decrease in one index when compared to the initial model (Figure 5.7). However, the results of the model in Figure 5.9 yielded high goodness-of-fit indices. Thus, this also indicated that the model fitted the observed data well.

Table 5.12: Re-Computation of Reliability and Validity of the Six Factors

	CR	AVE	Rates	Service	Environ	Scheduling	Handling	Docs
Freight Rates	0.710	0.531	0.729					
Service Quality	0.762	0.520	0.713	0.721				
Environment	0.904	0.759	0.345	0.494	0.871			
Scheduling	0.709	0.552	0.654	0.601	0.396	0.743		
Handling	0.627	0.470	0.472	0.593	0.426	0.295	0.686	
Documentation	0.758	0.623	0.592	0.460	0.195	0.760	0.136	0.790

Figure 5.8: Path Diagram Six Factors Modified Model of Two Item Deletion

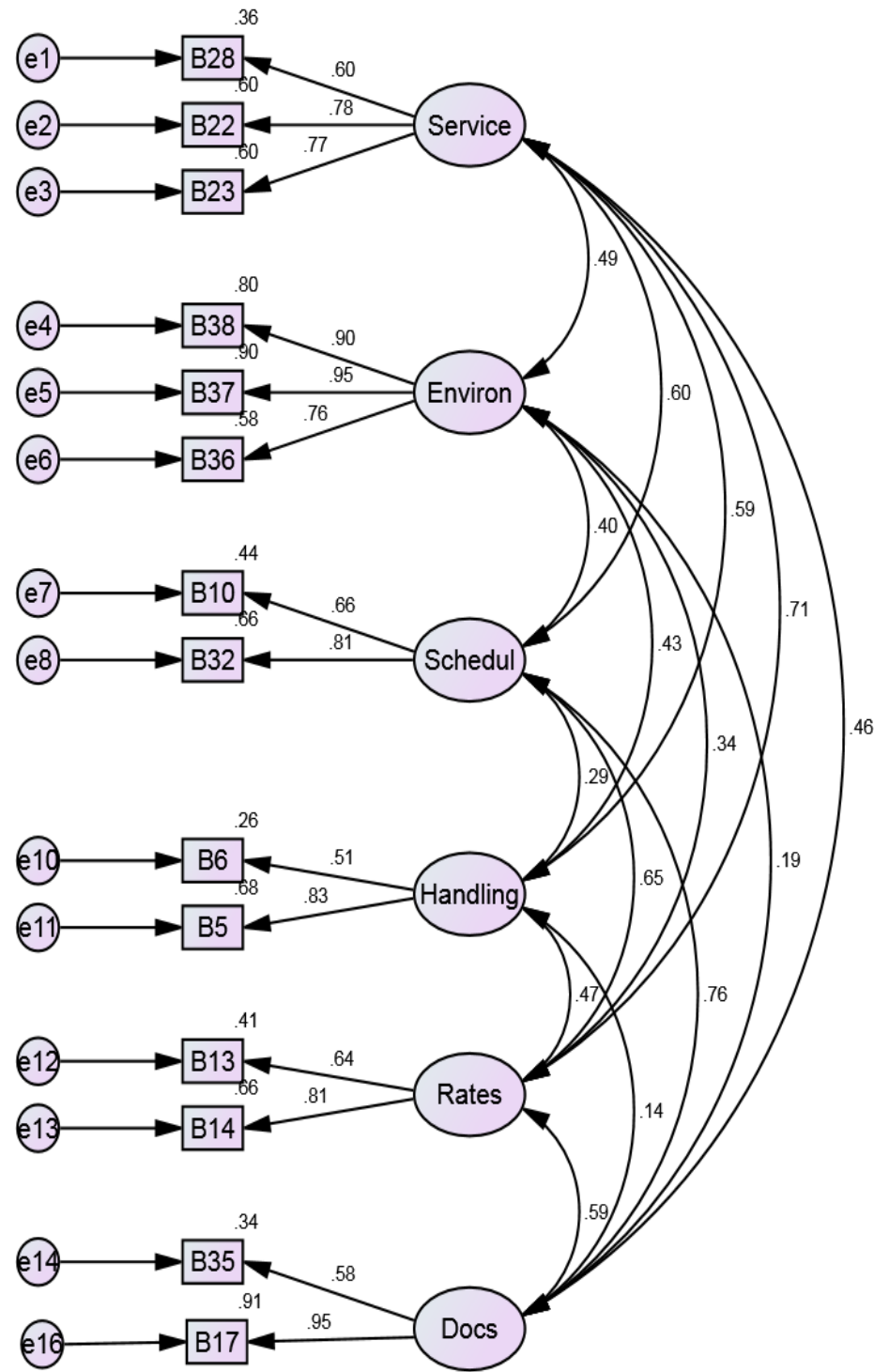
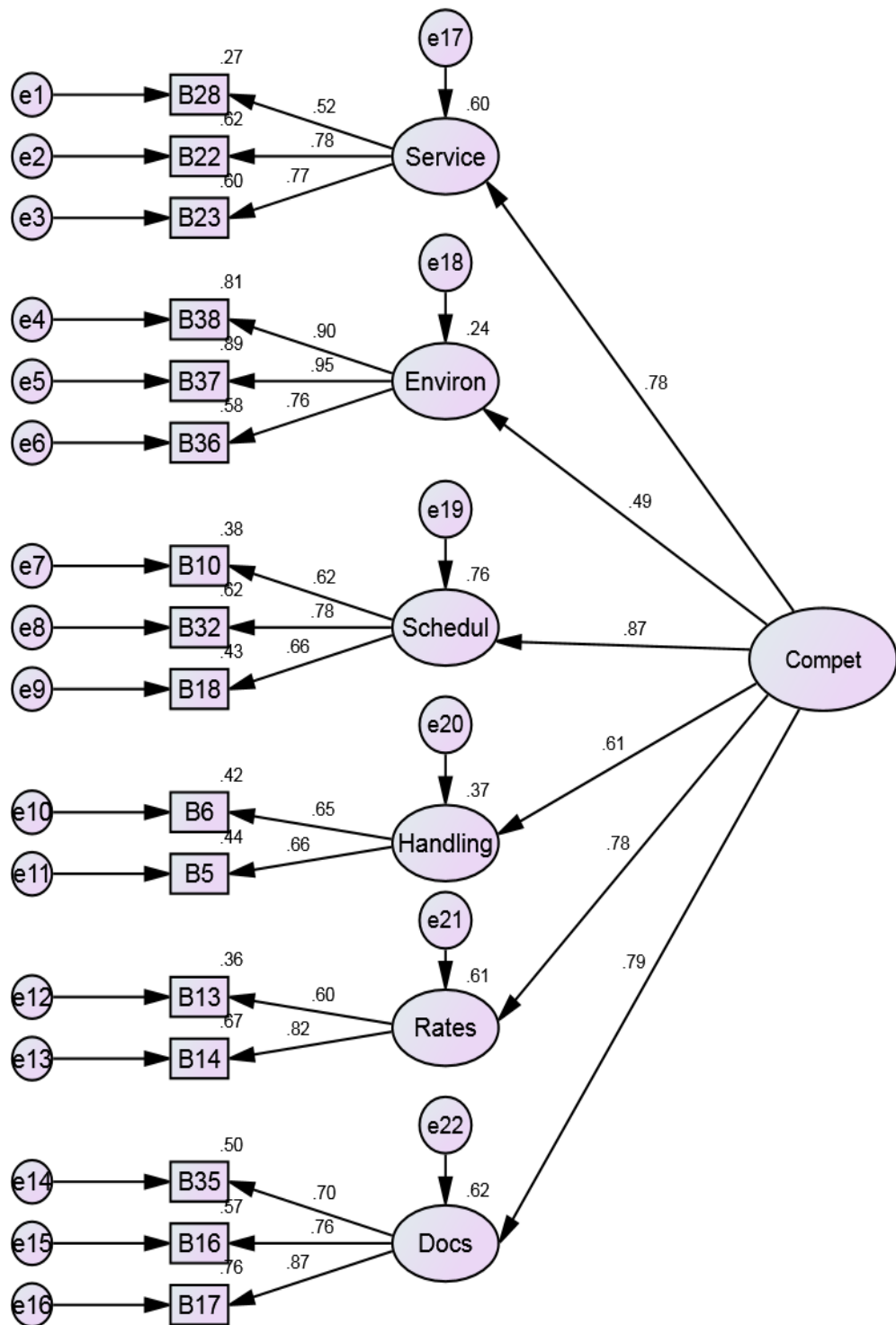


Figure 5.9: Path Diagram Six Factors Modified Model of the Competitiveness



There are a number of methodological issues which must be considered when using factor analysis in testing for a second-order model. First, tests of

the second order only make sense when there is reasonable invariance among first-order factors. And second, factor analysis may make redundant some relevant variables which may help in giving valuable insight about the data analysed. However, in this study the key variables are captured which reflect the important factors perceived by the respondents.

Table F-10 in Appendix F presents the comparison of the composite reliability and AVE for the initial six factor model and the second-order model. The second-order model showed that composite reliability for schedule reliability slightly decreased, but remained above the cut-off of 0.70, while other composite reliability's remained unchanged. However, there was an increase in the AVE for freight rate, schedule reliability, quick handling and document accuracy while service quality and environment remained unchanged. Thus, it is also signified that the second-order model fits the data well.

This study has employed the second-order CFA model because of the following reasons; it tested whether the hypothesised higher order factor truly accounted for the pattern of relations between the first-order factors. It put a structure on the pattern of covariance among the first-order factors, explaining the covariance in a more parsimonious way with fewer parameters. It separated variance due to specific factors from measurement error, leading to a theoretically error-free estimate of the specific factors. Finally, it provided useful simplification of the interpretation of complex measurement structures (Chen, FF, Sousa & West 2005).

The second-order model was assessed based on various measures. First, the Chi-square/df test value is 1.35, which was below the threshold value of 5.0. Similarly, the CFI value is 0.95, TLI value (0.94) and IFI value (0.95) were above the cut-off value of 0.90. Again, RMSEA, which is another important index for model fit also yielded a value of 0.59, which is also below the cut-off of $< .1$ (see Table F-7), which suits the recommendations by many scholars (Abdullah, Jan & Manaf 2012; Gaskin 2013c; Hair et al. 2010; Markus 2012). This therefore indicates a good fit of the present model. The majority of the 16 items demonstrated a loading of greater than 0.75 (Figure

5.9), with the highest and lowest being 0.95 and 0.52 respectively. The six latent domains ranged from .24 to .76, with an average of .53. The parsimonious fit (Chi-square/df), value was less than 5.0. Hence, this second-order model is acceptable and matches the survey data.

5.5 SUMMARY

The background of this study has been examined. The findings suggest that the factors perceived by freight forwarders as influencing carrier selection are essential to the survival of ocean container carriers within the competitive liner shipping market.

This chapter presented the results of a survey of 105 Ghanaian freight forwarders on issues related to their selection of liner operators, with the response rate of 54.4%. A test of non-response bias was conducted, and the results yielded no evidence of non-response bias.

The personal information collected from respondents revealed that 78% of them were working at a higher management level in their organisations. More than 75% of the respondents had six years or more work experience in the freight forwarding sector, indicating that they had considerable experience and professional knowledge in the selection of liner operators.

The preliminary analysis of the survey data through descriptive statistics of variables revealed that '*on time release of shipping documents*' is one of the most influential variables in freight forwarders' decision to select liner operators. This is followed by '*accuracy of shipping documents*,' and then '*competitive freight rates and charges*' as the second and third most important variables respectively.

Data collected from the survey was analysed using both EFA and CFA to identify underlying factors that Ghanaian freight forwarders considered important when selecting ocean container carriers. The results of the EFA indicated that the factors affecting the selection of ocean container carriers are; service quality, environment, schedule reliability, freight rate, quick

handling, and document accuracy. The results of CFA confirm the effect of these underlying influential factors on the competitiveness of ocean container carriers.

These results of the EFA and CFA will be further discussed in the next chapter.

CHAPTER SIX

INTERPRETATION OF THE ANALYSIS RESULTS AND DISCUSSION OF THE IMPLICATIONS

CHAPTER 6 DISCUSSION OF THE ANALYSIS RESULTS AND IMPLICATIONS

6.1 INTRODUCTION

This chapter discusses analysis results presented in the previous chapter. It also analyses the information collected from the survey's open-ended questions and draws implications for freight forwarders and shipping lines for the purpose of assisting the latter in addressing the issues raised. The chapter also presents recommendations on how shipping lines can improve their competitiveness based on the findings of this study. The chapter seeks to answer the following research questions (RQ) stated in Chapter 1.

RQ1: What are the key considerations for freight forwarders in their selection of liner carriers?

RQ2: In what ways do freight forwarders' carrier selection considerations and practices impact the competitiveness of liner carriers on a particular route?

RQ3: What are the issues facing freight forwarders in the selection of liner operators?

This chapter consists of three main sections. The next section presents the underlying factors identified which influence ocean container carrier competitiveness from the perspective of freight forwarders. It discusses interpretation of the hypothesis behind research question 2. Section 6.3 presents the survey results associated with the open-ended questions to answer Research Questions 2 and 3 regarding issues faced by freight forwarders when selecting carriers, and the implications that these factors have on liner shipping companies. Finally, Section 6.4 provides summary for the chapter.

6.2 THE INTERPRETATION OF THE RESULTS

The purpose of this section is to answer research questions 1 and 2 posed in Chapter 1, as well as addressing the proposed framework and six hypotheses developed in Chapter 4 which have guided the major data analyses behind this study. The results of these analyses and their interpretation are presented for research question 2 and its associated research hypotheses. The outputs of SEM are used to test and compare significance for the proposed model (as presented in Figure 5.7) and the second-order model (as presented in Figure 5.9).

6.2.1 RESEARCH QUESTIONS

To answer Research Question (RQ) 2, 'In what ways do freight forwarders' carrier selection considerations and practices impact the competitiveness of liner carriers on a particular route?' , the following research hypotheses (RH) were tested:

RH1: A liner operator's ability to offer higher service quality increases the competitiveness of that liner operator.

RH2: A liner operator's ability to offer highly accurate shipping documents increases the competitiveness of that liner operator.

RH3: A liner operator's ability to offer higher schedule reliability increases the competitiveness of that liner operator.

RH4: A liner operator's ability to offer higher flexible freight rates increases the competitiveness of that liner operator.

RH5: A liner operator's ability to offer quick handling increases the competitiveness of that liner operator.

RH6: A liner operator's ability to provide environmentally friendly operations increases the competitiveness of that liner operator.

Each of the above research hypotheses concern one influential factor of a liner operator's competitiveness. As explained in Chapters 4 and 5, an

industry survey of freight forwarders was carried out and the data collected from the survey was analysed using exploratory factor analysis (EFA). The results of the EFA were then further analysed using confirmatory factor analysis (CFA). Table 6.1 summarises the CFA results (for details of CFA, see Section 5.4 and Figure 5.9, Chapter 5) concerning the factors influential to liner operator competitiveness from the freight forwarder's perspective. These include the regression coefficient, critical ratios CR (calculated by dividing the coefficient estimate by the standard error estimate), P-values and the results of hypothesis tests. The findings presented in Table 6.1 suggest that the null hypothesis of no effect on liner operator competitiveness should be rejected at the 5% significant level. The term “supported” in the last column indicates the results of the hypothesis tests.

Table 6.1: The Findings of Six Latent Constructs

Hypothesis Statement of Path Analysis		Estimate	CR	P-value	Hypothesis Test Result
H1:	A liner operator's ability to offer higher service quality increases the competitiveness of that carrier	1.282	6.81	***	Supported
H2:	A liner operator's ability to provide environmentally friendly operations increases the competitiveness of that carrier	1.103	13.84	***	Supported
H3:	A liner operator's ability to offer higher reliable schedules increases the competitiveness of that carrier	1.386	7.49	***	Supported
H4:	A liner operator's ability to offer quick handling increases the competitiveness of that carrier	1.128	4.12	***	Supported
H5:	A liner operator's ability to offer higher flexible freight rates increases the competitiveness of that carrier	1.291	6.93	***	Supported
H6:	A liner operator's ability to offer accurate shipping documents increases the competitiveness of that carrier	1.121	7.69	***	Supported

The values of the coefficient indicate that the most important criteria regarding ocean container carrier competitiveness are schedule reliability, followed by documentation accuracy, freight rate, service quality, quick handling and environmental awareness. These results are further discussed below.

6.2.1.1 *Hypothesis 1 – Schedule Reliability*

There is a statistically significant, positive relationship between schedule reliability and competitiveness, at $p < 0.001$, indicating that the hypothesis is supported (see Table 6.1). The regression coefficient for the path from schedule reliability to competitiveness has the value of 1.39 (see Table 6.1), with its associated critical ratio value of 7.5, which is greater than the 1% critical value of 2.326 (Loxton 2015). Therefore, the null hypothesis of schedule reliability having no effect on liner operator competitiveness is rejected at 1%. The standardised regression weight predicting competitiveness by schedule reliability at 0.87 also indicates the strong effect of schedule reliability on competitiveness of liner operators (see Table F-8, Appendix F). The squared multiple correlation value of 0.76, suggests that 76% of the variation is explained by the schedule reliability variable (see Figure 5.9 and Table F-9). These confirm the effect of schedule reliability on liner operator competitiveness.

Interpretation: The analysis results indicate that freight forwarders plan the supply chain of their cargo owners with realistic expectations of delivery times. Therefore, selecting a shipping line with a reliable service schedule can enable them to achieve their supply chain goals. Surprisingly schedule reliability is the most important factor that freight forwarders consider when selecting ocean carriers, as unreliable schedules would have knock-on effects on hinterland transport. This finding within the Ghanaian context is somehow different from similar findings reported in other studies (Chung & Chiang 2011; Lam & van de Voorde 2011; Lun & Browne 2009; Vernimmen, Dullaert & Engelen 2007; Zhang & Lam 2014) which identified schedule reliability as a minor factor.

Liner shipping companies have to focus their resources on providing reliable schedule services by making cargo tracking services accessible to freight forwarders. The high loading of 'cargo tracking' at 0.78 among other schedule reliability items is in line with the results of other researchers in

which freight forwarders perceived cargo tracking important when choosing ocean carriers (Morimoto 2006).

The accuracy of tracking is important to freight forwarders because goods in transit are an inventory cost to the cargo owner. When customers ship cargoes, they want to know when their products will arrive, and they want a periodic update on their shipment status while waiting (Lee, HL & Billington 1992).

Freight forwarders also attached importance to the frequency of port to port calls (Van den Berg, Roy & De Langen 2015). As a result, they need a shipping line that can frequently call from port to port to enable them to ship their goods regularly without keeping the goods in stock for large numbers of days before getting a vessel to ship to the destination port. It is therefore important for shipping companies to keep their scheduled times reliable regarding the frequency of port calls.

In order for shipping companies to remain competitive and attract freight forwarders to their services, they need to commit to their service schedule. This can be done for example by ensuring that their operation is not interrupted by unexpected events and changes, through close coordination both internally (between the company divisions) and externally (with service partners and contractors).

The following comments were obtained from the survey of freight forwarders which support the dimension of schedule reliability:

- Survey respondents # 2, # 4, # 6 and # 64 mentioned that *periodic updates of shipment status by shipping lines and their provision of real-time information on shipment status is important to them.*
- Survey respondent # 28 stated that the *“tracking of cargo (specifically electronic tracking) will have to be improved, and shipping lines must also endeavour to make a significant improvement in the area of customer service by providing prompt feedback to customer enquiries”.*

This suggests that to improve their service schedule reliability, liner operators need to provide real-time cargo tracking services and offer timely information to their customers about their cargo locations, including to the freight forwarders.

6.2.1.2 Hypothesis 2 – Document Accuracy

As shown in Table 6.1, the path coefficient from documentation accuracy to competitiveness in the proposed model is statistically significant. This denotes a positive relationship between accurate documentation and competitiveness with $p < 0.000$, indicating that the hypothesis is supported. The regression coefficients for the path from documentation accuracy to competitiveness was satisfactory at the value of 1.12, with the critical ratio of 7.7, which is greater than the 1% critical value threshold. Hence, regression weight estimates for documentation accuracy to competitiveness are significantly different from zero. The standardised regression weight predicting competitiveness by documentation accuracy is 0.79, indicating a strong effect (see Table F-8 in Appendix F). The squared multiple correlation value of 0.62 suggests that 62% of the variation is explained by the documentation accuracy variable (see Figure 5.9 and Table F-9). Furthermore, Table 6.2 shows that all the items under documentation accuracy are statistically significant at $p < 0.000$. The direct effect between documentation accuracy and competitiveness yielded a high value of .79 (see Figure 5.9). Both strong correlations between documentation accuracy and competitiveness and the strong direct effect (see Figure 5.9) thus validate the relationship and confirm the hypothesis (H1).

Interpretation: Analysis results indicate that documentation accuracy is one of the main measures that freight forwarders use to judge the competitiveness of carriers. Documentation accuracy is not only important to freight forwarders, but it is also vital to liner shipping companies themselves, because it helps them avoid vessel delay in ports with customs officials and other authorities. Ocean container carriers should strive hard to maintain a high level of documentation accuracy.

A shipping line's ability to provide error-free documents is paramount to their competitiveness. For example, an error free Bill of Lading, quoting of rates, delivery order, cargo manifest and other shipping related documents enhances a shipping company's possibility to be selected by freight forwarders.

Table 6.2: Regression Weights for the Six Factors

			Estimate	S.E.	C.R.	P-Value
Service Quality	<---	Competitiveness	1			
Environment	<---	Competitiveness	1			
Scheduling	<---	Competitiveness	1			
Quick Handling	<---	Competitiveness	1			
Freight Rates	<---	Competitiveness	1			
Documentation	<---	Competitiveness	1			
B28	<---	Service Quality	1			
B22	<---	Service Quality	1.28	0.19	6.81	***
B23	<---	Service Quality	1.21	0.18	6.71	***
B38	<---	Environment	1			
B37	<---	Environment	1.10	0.08	13.84	***
B36	<---	Environment	0.90	0.09	9.89	***
B10	<---	Scheduling	1			
B32	<---	Scheduling	1.39	0.19	7.49	***
B18	<---	Scheduling	0.96	0.16	6.18	***
B6	<---	Quick Handling	1			
B5	<---	Quick Handling	1.13	0.28	4.12	***
B13	<---	Freight Rates	1			
B14	<---	Freight Rates	1.29	0.19	6.93	***
B35	<---	Documentation	1			
B16	<---	Documentation	1.12	0.15	7.69	***
B17	<---	Documentation	1.29	0.15	8.89	***

The respondents were very concerned with the on-time processing of accurate shipping documents. The accuracy of documents is one of the most important factors influencing freight forwarders and a shipper's choice of shipping lines since those documents are used as formal evidence, especially in international payment of goods procedure, therefore, freight forwarders attach a high level of importance to the accuracy of documents. Previous studies have identified accuracy in documents, but attributed a low level of importance to the influence of that on the decision making of freight forwarders and cargo owners (Banomyong & Supatn 2011; Lu 2003a; Reid & Burlingame 2015).

It is important therefore for liner shipping companies to pay a high level of attention to accurate shipping documents, because any discrepancies on these may cause delay, and further lead to a penalty and other charges, such as the fee for a letter of credit correction or amendment of bill of lading. Thus, “ocean carriers who paid more attention to the bill of lading accuracy would highly satisfy freight forwarders” (Wen & Huang 2007p. 799). Furthermore, Tuna and Akarsu (1999) and Tuna and Silan (2002) noted that accuracy of shipping documents, especially an accurate bill of lading, are an important factor considered by freight forwarders and shippers. Similarly, accurate and error-free documentation is needed to achieve the e-commerce goal of quick clearance of goods through customs posts, as import and export clearances are carried out electronically to facilitate trade (Branch & Roberts 2014).

6.2.1.3 Hypothesis 3 – Service Quality

There is a statistically significant, positive relationship between service quality and competitiveness, with $p < 0.000$ indicating that the hypothesis is supported (cf. Table 6.1). The high factor loading and low error variances within this factor suggest that the proposed indicators capture well the construct and support the hypothesis. The regression coefficients for the path from service quality to competitiveness was satisfactory at the value of 1.3 (see Table 6.1), with its associated higher critical ratios value of 6.8, denoting that the regression weight estimating service quality to competitiveness is significantly different from zero. The standardised regression weight predicting competitiveness from service quality (0.78) indicates a strong effect (see Table F-8 in Appendix F). The squared multiple correlation value of 0.60, suggests that 60% of the variation is explained by the service quality variable (see Figure 5.9 and Table F-9). Table 6.2 shows that all the items under service quality are statistically significant at $p < 0.000$. Service quality has a strong effect on shipping line competitiveness, yielding a direct effect value of .78 (see Figure 5.9).

Both of these strong correlations between service quality and competitiveness, and the strong direct effect (see Figure 5.9) validate the

relationship and confirm hypothesis (H1). The coefficient between service quality and competitiveness is significant with a value of 0.78 ($p < 0.000$), indicating that service quality is strongly associated with competitiveness.

Interpretation: This result reveals that service quality influences liner operator competitiveness and that the knowledge of ocean container carrier staff is essential for delivery service quality. The finding is consistent with a previous similar study by Salleh et al. (2014) and Yang and Sung (2016) which stated that knowledge management capability of staff and the improvement of employee efficiency is a key to providing impeccable liner shipping service. Therefore, it is essential that liner shipping companies employ strategies such as staff knowledge capacity building and professionalism of staff that will enable them to provide a quality shipping service.

A liner shipping company that intends to provide a quality shipping service to satisfy its customers must improve the knowledge of its staff, and also enhance their professionalism towards freight forwarders. The present study found that both the professionalism and knowledgeability of shipping line staff significantly influenced service quality from the perspective of freight forwarders.

For that reason, shipping companies should invest in their personnel through the acquisition of more in-depth knowledge about the services they are providing to freight forwarders. More especially, shipping lines should invest in their front desk staff, since they are the first point of contact for freight forwarders in their daily dealings with the shipping companies.

Ocean container carriers should focus on understanding the service needs of their customers. The essential ingredient for the success of liner operators lies in their understanding of customers, in order to keep them satisfied (Durvasula, Lysonski & Mehta 2000; Yuen, Thai & Dahlgaard-Park 2015).

Service quality has been identified as a driving force in the success of shipping firms, whereby shipping firms understand exactly what customers

see as important (Pantouvakis 2007). A customer oriented shipping firm is a shipping firm that is knowledgeable about client needs, and knows how reliant the firm is on those needs for continuous value creation and delivery (Plomaritou, Plomaritou & Giziakis 2011).

The comments from some of the web-based survey respondents supported this view:

Survey Respondents # 1, # 25, # 44, # 55, # 56 and # 69 noted that *shipping lines' front desk officers should be knowledgeable to respond to our queries without delay and shipping lines should invest in their staff to provide a professional service to us.*

It is evident from survey respondent comments that liner shipping companies should strive hard to understand their customers' service needs in order to respond to them effectively. It is interesting to note that freight forwarders are paying attention to how shipping lines respond to their emergency needs as well. Freight forwarders consider emergency services to be those such as advance manifest submission to enable clearance of time sensitive goods, loading of late-processed shipments and ability to accept cargo to one-off destinations.

6.2.1.4 Hypothesis 4 – The Freight Rate

There is a statistically significant, positive relationship between freight rate and competitiveness with $p < 0.000$, indicating that the hypothesis is supported (see Table 6.1). High factor loading and low error variances within the freight rate factor suggest that the proposed indicators captured well the construct and supported the hypothesis. The regression coefficients for the path from freight rate to competitiveness was satisfactory at a value of 1.3 (see Table 6.1), with its associated higher critical ratios value being 6.9, which is greater than the 1% critical value of 2.326 (Loxton 2015). Therefore, the null hypothesis of the freight rate having no effect on liner operator competitiveness is rejected at 1%.

The standardised regression weight predicting competitiveness to freight rate at (0.78) also indicates a strong effect (see Table F-8). The squared multiple correlation value of 0.61 suggests that 61% of the variation is explained by the freight rate variable (see Figure 5.11 and Table F-9). Table 6.2 shows that all the items under freight rate are statistically significant at $p < 0.000$. The Freight rate has a strong effect on liner operator competitiveness, yielding a direct effect value of .78 (see Figure 5.11). The strong correlation between freight rate and competitiveness and the associated strong direct effect (see Figure 5.11) thus validates the relationship and confirms hypothesis (H1). The coefficient between the freight rate and competitiveness is significant with a value of 0.78 ($p < 0.000$), indicating that the freight rate is strongly associated with competitiveness.

Interpretation: The analysis results indicate that freight forwarders pay attention to the simplicity of freight rates and their structure, as well as the transparency of freight rates and charges. This is because they are a transport intermediary that buys transport services on behalf of clients and are thereby critically concerned with the setting and structure of liner operator rates.

Any shipping company which aims to improve its competitiveness has to compose its freight structure in a simpler way that can be easily understood by freight forwarders for easy interpretation to their clients. The higher loading of the simplicity of freight rates and their structure indicates that survey respondents are particularly concerned about them. Therefore, ocean container carriers should try their best to set up a freight rate template or table that can be easily understood rather than shipping companies merely quoting lumpsum total freight rates, which are difficult for freight forwarders to understand.

Liner shipping companies should also try to implement a standard freight rate template with detailed freight rate components that freight forwarders can access freely to enable them to estimate rates themselves. However, shipping companies should be able to update the freight rate template

regularly. An updated freight rate template could enable forwarders to access real time freight rate information.

The survey respondents perceive a well structured and updated freight rate as one of the influential factors that impacts their decision in choosing liner operators, and the result is similar with the findings of study by Banomyong and Supatn (2011). Reis (2014) also identified it as the most important factor influencing freight forwarders' choice of liner operators. The thirty year study of Randers and Göluke (2007) on system dynamics models also revealed that a shipping company's attraction of cargo volume is strongly correlated over time with a simple system of freight rates.

In the same way, some of the web-based survey respondents within the Ghanaian context (# 44 and # 75) mentioned that not getting a *transparent freight rate* is their biggest challenge in choosing the right shipping line for their customers. Transparency and simplicity of freight rate are essential to freight forwarders as they generate revenue from the mark-up of the rates acquired from ocean container carriers.

6.2.1.5 Hypothesis 5 – Quick Handling

There is a statistically significant, positive relationship between quick handling and competitiveness with $p < 0.000$, indicating that the hypothesis is supported (see Table 6.1). Both the loading and low error variances within the quick handling factor suggest that the proposed indicators captured the construct and supported the hypothesis.

The regression coefficients for the path between quick handling and competitiveness was also satisfactory at the value of 1.1 (see Table 6.1), with its associated critical ratios value of 4.1, which is greater than the 1% critical value. Therefore, the null hypothesis of quick handling having no effect on liner operator competitiveness is rejected at 1%. The standardised regression weight predicting competitiveness from quick handling (0.61) indicated a good effect (see Table F-8 in Appendix F). The squared multiple correlation value of 0.37, suggests that 37% of the variation is explained by the quick

handling variable (see Figure 5.11 and Table F-9). Table 6.2 shows that all the items under quick handling are statistically significant at $p < 0.000$.

Quick handling has a moderate effect on the competitiveness of a shipping line, yielding a direct effect value of 0.61 (see Figure 5.11). The moderate correlations between quick handling and competitiveness, and the associated strong direct effect (see Figure 5.11) validated the relationship and confirmed hypothesis (H1). The coefficient between quick handling and competitiveness is significant with a value of 0.61 ($p < 0.000$), indicating that quick handling is effectively associated with competitiveness.

Interpretation: The results indicate that freight forwarders view a liner operator's ability to handle goods quickly and without any interruption as being very important when choosing between liner shipping companies. The higher loading on a dedicated berth by shipping lines with quick handling items indicated that freight forwarders attribute a high-level of concern to a liner shipping company's ability to obtain a berth on arrival, or have a dedicated berth available, and that this plays a critical role in their selection of liner operators. In this way the berthing of ships on arrival by shipping companies, or the berth allocation by shipping lines, is perceived as an important contributor to the competitiveness of shipping lines, this result is similar with the findings of previous studies (Kaselimi, Notteboom & De Borger 2011; Legato & Mazza 2001; Raa, Dullaert & Van Schaeren 2011).

A liner operator that is determined to increase its market share percentage must endeavour to berth their vessels on arrival to avoid delays. Most liner shipping companies stay longer at anchorage to wait their turn to berth in Ghana ports, as Ghanaian ports operate on a first-come-first serve basis. Therefore, freight forwarders pay attention to carrier's ability to berth on arrival. The result confirmed the findings of Imai, Nishimura and Papadimitriou (2003) and Lai and Shih (1992) which noted that on time berthing or berthing on arrival is important to shippers as most ports operate on a first-come-first-serve basis. Especially during periods of congestion, most ships stay outside the ports for days to await their turn, which affects

the shipping lines service reliability. The longer a ship stays at anchorage/berth, the higher the cost a ship incurs, and this cost can be passed on to freight forwarders in terms of higher freight charges and other local related charges (Tongzon 2009).

Shipping companies may lose customer loyalty if their vessels are delayed at anchorage due to the unavailability of berth (Soppé, Parola & Frémont 2009). Just as much as liner shipping companies are able to get their vessels to berth on arrival, they should also aim to integrate smooth handling processes from sea going ships to other carriers such as barges, aircrafts, rail waggons and trucks to enable them attract Ghanaian freight forwarders. Delays in handling cargo to and from vessels to other carriers pose significant cost risks to freight forwarders, as hinterland transport is associated with high costs (Riessen et al. 2015).

In response to on time berth, a number of liner shipping companies are taking the initiative to operate dedicated berths by entering into the terminal operating industry through vertical integration strategies of inclusion of landside operations (Kaselimi, Notteboom & De Borger 2011). Thus ocean container carriers can benefit by operating a fully dedicated terminal. The benefits include efficiency gains, cost reduction, revenue generation, the preservation of schedule reliability, the delivery of value added, the provision of a “one-stop-shop” service to customers and increased profitability (Haralambides, Cariou & Benacchio 2002; Kaselimi, Notteboom & De Borger 2011; Midoro, Musso & Parola 2005; Notteboom 2007; Peters 2001).

6.2.1.6 Hypothesis 6 – The Environment

There is a statistically significant, positive relationship between the environment and competitiveness with $p < 0.000$, indicating that the hypothesis is supported (Table 6.1). The high loadings of items under this factor, and the moderate error variances within the environment factor suggest that the proposed indicators captured the construct and support the hypothesis. The regression coefficients for the path between environment and competitiveness was satisfactory at the value of 1.1 (see Table 6.1), with

its associated critical ratios value of 13.8, which is greater than the 1% critical value.

Therefore, the null hypothesis of the environment having no effect on liner operator competitiveness is rejected at 1%. The standardised regression weight predicting competitiveness from the environment (0.49) indicates a moderate effect (see Table F-8). The squared multiple correlation value of 0.24, suggests that 24% of the variation is explained by the environment variable (see Table F-9 in Appendix F). However, Table 6.2 shows that all the items under environment are statistically significant at $p < 0.000$. Therefore the environment factor has a moderate effect on a shipping line's competitiveness, yielding a direct effect value of 0.49 (see Figure 5.11).

The correlations between environment and competitiveness, and the associated moderate direct effect (see Figure 5.11) validated the relationship and confirmed hypothesis (H1). Thus, this points out that the environment is strongly associated with competitiveness from the perspective of Ghanaian freight forwarders.

Interpretation: These results indicate that environmental issues are critical to freight forwarders when they select ocean container carriers. The debate over global warming is an important issue dominating the discussion of governments and international organisations, and freight forwarders are also following suit in this debate. Ghanaian freight forwarders are gravitating towards environmental issues therefore taking environmental issues seriously when selecting liner operator. Several stakeholders, varying from exporters/importers and freight forwarders to governmental bodies and non-governmental organisations, have shown concerns regarding environmental repercussions brought by shipping associated activities (Hao, Geng & Ou 2015; Wu & Dunn 1995). The level of pollution and losses caused by shipping operations which cause environmental challenges has lead to tighter regulations concerning shipping operations (Lai et al. 2011).

The maritime sector, especially the liner sector, is now required to operate its ships in a more environmentally friendly manner due to increasing awareness and concerns of stakeholders regarding global warming and climate change. As a result, Ghanaian freight forwarders are paying attention to the ability of liner shipping companies to reduce environmental pollution as well as towards their commitment to cut down CO₂ emissions which is consistent with similar findings by Hao, Geng and Ou (2015). The higher loading of a 'carriers commitment to reduce CO₂ emissions' is an indication that freight forwarders consider environmental issues critical when selecting liner shipping companies. Freight transport service buyers have a great amount of influence on how shipping companies can reduce CO₂ emissions when providing freight transport services (Rogerson 2013).

Freight forwarders and shippers are increasingly considering environmental issues when purchasing liner shipping services (Lun, Lai & Cheng 2013). Shipping activities can cause environmental pollution, especially in the spillage of oil and the discharging of garbages into the marine environment by ships, which are the main source of concern for policy-makers. Freight forwarders are paying attention to the capability of liner shipping companies in using renewable energy in ship operations and thus reducing their environmental impacts, and so this finding in the Ghanaian context is consistent with other previous studies (Yang 2012b; Yang et al. 2013).

To reduce the environmental effects of shipping activities, liner operators can implement the following strategies outlined by the International Maritime Organisation (IMO), such as enlargement of vessel size, reduction of voyage speed, and the application of new technologies (Woo & Moon 2014). Liner shipping companies operating in Ghana therefore must pay attention to environmental issues by engaging in more environmentally friendly operations in order to attract freight forwarders. The reduction of a vessel's CO₂ emissions received considerable high loading among environment factor which indicates that respondents consider carrier ability to reduce CO₂ emissions which is also directly linked to a ship's fuel consumption, therefore

such considerations can have long-term cost benefits for shipping companies, and so the result this study in the Ghanaian context is consistent with other previous studies (Hao, Geng & Ou 2015; Maloni, Paul & Gligor 2013).

Liner operators should take the initiative to implement strategies for reducing environmental damage from their operations. A liner operator's ability to practice environmental friendly operations will inevitably lead to the enhancement of their carrier competitiveness in the market.

Many shipping organisations have taken the initiative to find ways that will help them reduce environmental impacts of their operations (Lai et al. 2011). The employment of external strategies by liner shipping companies can also help mitigate environmental effects of shipping activities thereby enhance their competitiveness from the perspective of freight forwarders. Even though it is said that container vessels represent only a small percentage (4%) of all maritime vessels, they still have generated 20% of the emissions in international shipping (Psaraftis & Kontovas 2010). Thus, some ocean container carriers are adopting lower steaming to reduce the amount of fuel burn and reduce CO₂ emissions, and alternatively lower their fuel costs (Cariou 2011; Longva, Eide & Skjong 2010).

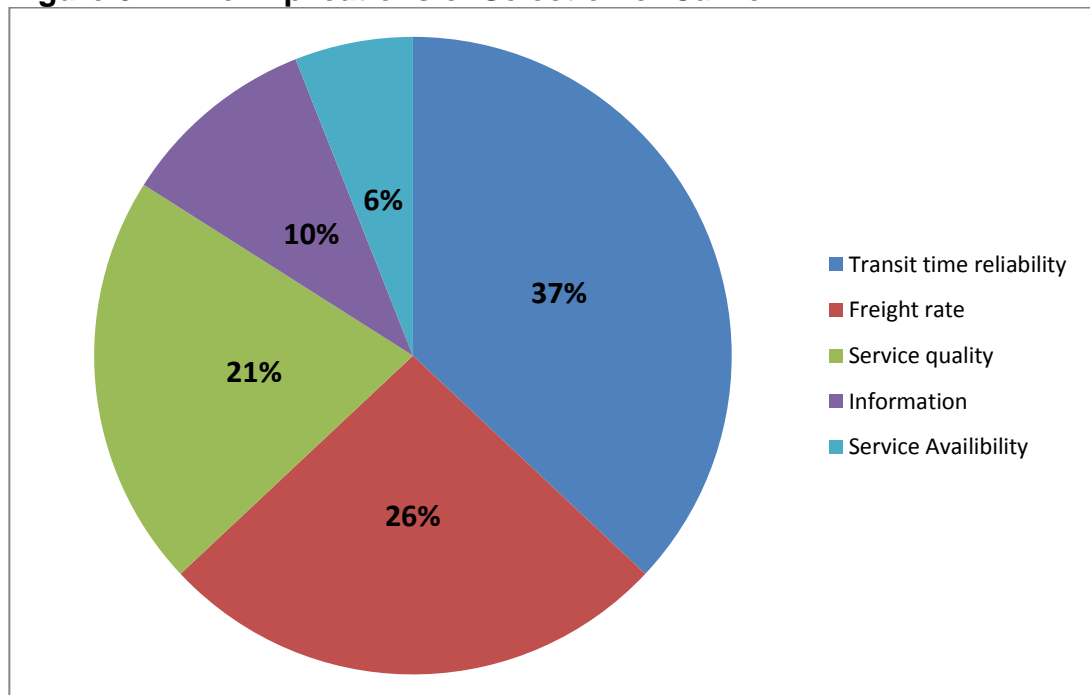
6.3 THE IMPLICATIONS FOR LINER OPERATORS

This section presents the survey results from the open-ended questions. Appendix G-1 shows the full responses from survey participants. These questions are primarily related to Research Questions 2 and 3 on the challenges faced by freight forwarders when selecting liner operator and also the influential factors perceived by them and its implications for shipping lines, freight forwarders, shippers and future research. The selection of ocean container carriers from the perspective of freight forwarders has implications on liner shipping companies. Liner shipping companies must work closely with them to understand the issues and concerns of their customers.

Figure 6.1 shows the issues and concerns raised by the Ghanaian survey respondents when selecting ocean container carriers, with transit time reliability, freight rate, service quality, lack of information and service availability representing 37%, 26%, 21%, 10% and 6% respectively. The issue that respondents considered most critical when choosing ocean container carrier was the transit time reliability of the ocean container carrier. The majority of respondents considered transit time reliability as a critical issue, as also found in Tongzon (2009). The survey results obtained from the open-ended responses thus confirmed the CFA results reported in Chapter 5 and are consistent with the studies of Lam and Zhang (2014), Merk, Busquet and Aronietis (2015) and Zhang and Lam (2014) regarding the importance of transit time reliability to freight forwarders and shippers.

The comments from some respondents affirmed that transit time reliability and frequency of port calls impacted greatly on their selection of ocean container carrier. For example, survey respondent # 10 commented that “*transit time delays and late responses to requests*” significantly affected his choice of suitable carrier. Survey respondent # 32 noted that *delayed transit times could potentially disrupt the entire cargo planning system*.

Figure 6.1: The Implications of Selection of Carrier



Similarly, survey respondent # 37 mentioned that *“delays and unreliable schedules”* were major constraints on their choice of ocean carriers. *“Untimely arrival of the vessel, a late update of vessel’s arrival, berthing and departure time”* was mentioned by respondent # 29 as a key issue that they faced with ocean container carriers. Survey respondent # 67 pointed out that the *“lack of information on arrival and departure time of vessels and total transit time”* affected their decision making of suitable ocean carrier, and this was repeated by survey respondent # 56 who stated that *“not having enough information available on vessels transit times”* was the most challenging issue for them as well.

Respondent # 75 and # 94 expressed that *unreliable transit times were the main concern in their selection of liner operators*. Again, survey respondent # 40 stipulated that a *“shipping line’s scheduled published information is mostly inconsistent with the situation on the ground”*. Additionally, survey respondent # 55 mentioned that *“the major challenge is vessel arrival, many times we find it very difficult to tell importers the arrival date of a particular vessel, because a given date by a shipping line keeps on changing, requesting an importer go to his or her airline to change his/her flight date of departure, which attracts a fee”*. Many other respondents also mentioned that non-frequency of shipping services by liner shipping companies is a serious concern for them in their decision-making of ocean carrier.

Unsurprisingly, the flexibility of freight rate was identified as the second most important issue that the Ghanaian respondents considered when choosing ocean container carriers (see Figure 6.1). This was in line with the findings of a similar study conducted by Gailus and Jahn (2013), Chu (2014) and Reis (2014). The respondents noted that the ability of liner shipping companies to be flexible around negotiating rates, and their ability to offer rebates or credit terms regarding rates and other local charges were essential to respondents. Liner shipping companies need to be flexible enough to negotiate freight rates and other charges with freight forwarders in order to win their confidence in their liner service.

Since most shipping companies are holding agencies for their principals in Ghana, those companies do not have the mandate to negotiate freight rates. However, the principals should be able to give some level of negotiation power to their agencies in order to win over freight forwarders. Survey respondents mentioned that the lack of information about freight rates was a great source of concern for them, in that shipping companies do not make information available regarding rates in real time to enable the forwarders to provide accurate freight quotations to cargo owners. Respondents also emphasised that the ambiguity and lack of transparency of freight rates and local charges was a key issue faced when choosing an ocean container carrier. Freight forwarders expect liner shipping companies to quote transparent freight rates for easy interpretation by freight forwarders to their customers.

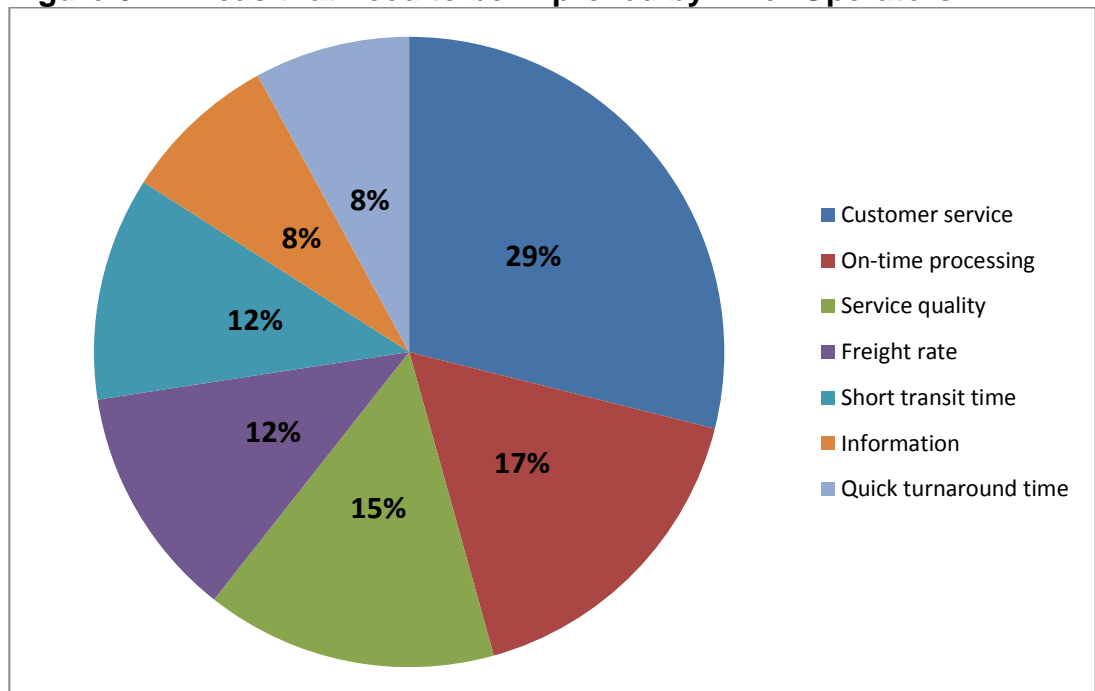
Survey respondent # 19 stated that the *“inability to get information from shipping lines on freight charges to compare”* was a major challenge in their decision-making process. Survey respondents # 44, # 77 and # 86 all mentioned that *transparency of freight rate was the key issue for them also, as some liner shipping companies have hidden costs which they do not disclose until the cargo is loaded on board.*

One of the biggest concerns of participants was that there is no system or database available for freight forwarders to check market freight rates. Shipping companies frequently change their rates, making it difficult for them to make decisions.

When respondents were asked to identify aspects of liner shipping services that needed to be improved, most respondents mentioned customer service (29%), on-time processing (17%), service quality (15%), freight rates (12%), short transit time (12%), information technology (8%) and quick turnaround (8%), as shown in Figure 6.2. The majority of freight forwarders suggested that shipping companies should focus on customer service quality as one of the areas that needed improvement. Liner shipping companies should be customer oriented by responding to freight forwarders' requests on-time.

Liner shipping companies can improve their customer service levels by training their front desk officers and ensuring prompt responses to customer queries. The staff of liner operators have to show an attitude of care to freight forwarders even if they are not able to help or solve problems faced by them. Most freight forwarders considered the attitude of liner shipping company staff as crucial to their customer satisfaction.

Figure 6.2: Areas that need to be Improved by Liner Operators



Some of the comments provided by respondents are in support of customer service improvement by liner shipping companies as follows:

- Survey respondent # 1 said that *“liner shipping companies have to improve their customer service area.”* This is in relation to how liner shipping companies respond to freight forwarder queries.
- Respondents # 6 and # 27 stated that *liner shipping companies should focus on improving their customer service levels.*
- Respondents # 19 and # 66 said that *in order for liner shipping companies to improve their service levels they have to respond*

promptly to freight forwarder complaints and release their delivery orders on-time for cargo clearance in port.

- Survey respondent # 28 stated that *“shipping lines must endeavour to make a significant improvement in the area of customer service by providing prompt feedback to the customer”*.

Human relationships and timely delivery of information are the most important elements mentioned by survey respondents # 7, # 21 and # 74 as areas that shipping companies have to improve in order to enhance their customer service. Other survey respondents, including respondents # 29, # 34, # 37, # 41, # 56, # 93, # 96 and # 101 all mentioned that liner shipping companies have to place their customers as the highest priority by showing concern for them.

Other areas such as on-time processing of shipping documents, service quality, the freight rate, short transit times, information sharing and quick turnaround times also need to be improved by liner shipping companies to enhance their competitiveness in the maritime transport sector. Improvement in these areas will enable them to improve their service attractiveness to freight forwarders.

When the respondents were asked to write any comments that would be relevant to the study most of them stated that shipping lines should maintain a high level of customer service by responding to freight forwarders on time, followed by the shipping lines schedule being reliable. Some of the respondents also mentioned on-time information sharing by shipping companies. Transit time related issues and documentation accuracy were also some of the areas that shipping lines need to improve.

The following comments support the importance of customer service level:

- Survey respondent # 1 said *“I believe shipping lines need to understand their customers more and try working closely with their customers”*.

- Respondent # 3 also commented that “*shipping companies should try to understand their customer's needs*”.
- Respondent # 25 raised their concern about *the front desk officers of some shipping companies*.
- Again, the willingness of shipping line staff to relay information to customers in a timely way, and their attitude to them were also brought up by survey respondents # 61, # 75 and # 77, who believed that liner shipping companies should take an extra step in understanding their needs, especially with regards to the sharing of cargo service information to freight forwarders on time.

Liner shipping operations are driven by market competition. Every liner shipping company is under pressure to attract customers in order to stay in the market. A liner operator's inability to attract customers may lead to an exit of such carrier from the market. For example, the recent exit of Hanjin shipping from the dynamic liner market was due to its inability to attract enough cargo volumes from customers to match its vessels capacity (Braden & Sue 2016).

Liner operator's understanding of the most important factors for their customers can enable them to satisfy customer demands. Customer satisfaction is one of most critical factors for liner shipping companies to retain and expand their market share (Yang & Sung 2016; Yuen, Thai & Dahlgaard-Park 2015) and it is imperative for liner shipping companies to meet the service needs of their customers.

The survey results showed that customer services are absolutely essential for customers. Ocean container carriers need to make a great deal more effort to devote resources to enhance their service quality and customer satisfaction as suggested by Świtała and Kłosa (2015).

6.4 SUMMARY

This chapter discussed the results of the exploratory and confirmatory factor analysis presented in the previous chapter. Based on the results of the

survey, including both Likert-scale and open-ended questions, it discussed the implications and recommendations for shipping lines and freight forwarders.

Six influential factors in carrier selection were identified, namely service quality, document accuracy, freight rate, quick handling, schedule reliability and the environment. The survey also revealed that respondents within the Ghanaian context considered schedule reliability as the most important factor for them, followed by document accuracy, freight rate, service quality, quick handling and the environment. The hypothesis of the selection factors for ocean container carriers was tested and interpreted in this section. The results supported the fact that the six influential factors were *schedule reliability, documentation accuracy, freight rate, service quality, quick handling and environment* and that they have a significant impact on the competitiveness of ocean container carriers. The findings of this study are similar with those of other previous studies (Coulter et al. 1989; Matear & Gray 1993; Setamanit & Pipatwattana 2015; Zhang & Lam 2014, 2015).

Information from the open-ended questions of the survey was also analysed. The qualitative analysis results revealed the implications of carrier selection factors on the business sustainability of ocean container carriers from the freight forwarder perspective. Issues such as *customer service, transit time reliability, on-time processing, freight rate, service quality, lack of information, service availability, short transit time, and quick turnaround time* were the challenges raised by them.

These findings within the Ghanaian context were in line with the results of previous other studies, such as Brooks (1995), Brooks et al. (2012), Van den Berg, Roy and De Langen (2015) and Wen and Lin (2015). The results of the open-ended questions further revealed that in order to attract freight forwarders, liner shipping companies have to focus on the following areas of their service:

- *customer service*

- *on-time processing of documents*
- *short transit times*
- *service quality*
- *freight rates*
- *quick turnaround times*
- *information processing*

This result also confirmed the findings of other previous studies in differing contexts on carrier selection, such as those by Coulter et al. (1989), Lu (2007) , Chen et al. (2010), Ding (2010), Juga, Juntunen and Juntunen (2012), Kannan, Bose and Kannan (2012) and Ding et al. (2016).

CHAPTER SEVEN

SUMMARY, IMPLICATIONS, RECOMMENDATIONS AND CONCLUSIONS

CHAPTER 7 CHAPTER 7: Summary, implications, recommendations and conclusions

7.1 INTRODUCTION

This chapter presents an empirical investigation of the phenomena of liner operator selection factors and their influence on the competitiveness of ocean container carriers in the context of Ghana. The principal research question RQ2 underpinning the thesis was: In what ways do freight forwarders' carrier selection considerations and practices impact the competitiveness of liner carriers on a particular route? The primary objective was to develop a conceptual framework and show the possible impacts of factors behind ocean container carrier selection on the competitiveness of liner shipping companies for empirical testing.

To address the research questions and achieve the research objectives, a comprehensive review of possible theories and theoretical literature was conducted, and all relative directions towards identifying the determinants of liner operator selection from the perspective of freight forwarders were consolidated in Chapter 2.

The study linked this literature review of ocean container carrier selection criteria to freight forwarder buying behaviour in Chapter 3, and developed a theoretical, conceptual framework model for better insight into the selection criteria influencing the competitiveness of ocean container carriers.

To investigate the effect of ocean container carrier selection factors on liner shipping company competitiveness, a quantitative methodological approach was integrated in Chapter 4, where the liner shipping sector in Ghana, and its contribution to the Ghanaian economy was discussed, and the question of why the present study should be observed from the Ghanaian maritime perspective was also considered.

The quantitative model was tested using EFA and CFA in Chapter 5, with the primary data collected from survey respondents. The empirical results of the EFA

and CFA were then analysed and interpreted in Chapter 6, and the results of the open-ended questions were discussed in Chapter 6.

In the present Chapter 7, the findings of the study will be summarised to address the theoretical and practical implications, as well as contributions of this study. This chapter concludes with a discussion of the limitations of this study and it makes recommendations and offers directions for future research.

7.2 SUMMARY OF THE STUDY'S MAIN FINDINGS

The evaluation of ocean container carrier competitiveness from the point of view of customers attraction and profit maximisation has become an increasingly important issue in liner shipping marketing (Jia, Govindan & Kannan 2015; Plomaritou, Plomaritou & Giziakis 2011; Shang & Lu 2012). Liner shipping companies are under intense pressure to increase their market share due to the strong competition that has erupted from international players in recent years, leading to structural changes in the industry (Da Cruz, Ferreira & Azevedo 2013). Thus, liner operators are finding new ways to attract business-to-business customers. The main business-to-business customers for ocean container carriers are the freight forwarders (Konsta and Plomaritou 2012) who tender high volumes of cargo to liner operators (Amaruchkul, Cooper & Gupta 2011; Flitsch & Jahn 2014; Parola & Musso 2007).

In order for this study to answer the main research question, six hypothesis were developed based on an extensive review of the literature. The possible factors were identified as documentation accuracy, freight rate, environment, schedule reliability, quick handling and service quality. A research model was developed to validate the proposed operational view and measure the effects of these factors on the competitiveness of liner shipping companies.

To achieve the research objectives, it was essential for this study to employ an appropriate methodological approach to test the proposed model. Therefore, primary data were collected from maritime freight forwarders operating in Ghana. The mailing of the survey link and the three follow-ups elicited 105 valid responses (54.4% response rate).

The proposed models were tested using structural equation modelling (AMOS based version 22) and the proposed first-order and second-order models were found to be a better fit model regarding parsimonious fit and exploratory power. The fit indices for the second-order model showed a very good model fit (CMIN = 1.35, CFI = 0.95, TLI = 0.94, IFI = 0.95 and RMSEA = 0.59). The results of this model were discussed in Chapter 5. The results of the second-order output indicated a positively significant relationship between schedule reliability, document accuracy, freight rate, service quality, quick handling and environment to competitiveness (supporting H1, H2, H3, H4, H5 and H6). However, it was revealed that schedule reliability had the highest direct effect on the competitiveness of a liner shipping company. Additionally, the model was verified and interpreted in Chapter 6.

The findings of the study affirmed the theoretical assertions. However, they did not confirm the assertions of the influence of information technology on liner shipping company competitiveness. The findings also revealed that survey respondents paid equal attention to other influential factors, as validated by the second-order model with high direct effect loadings.

The findings of the survey data analysis indicated that schedule reliability, documentation accuracy, freight rates and service quality were critical to freight forwarders' decisions in selecting liner operators. Based on these findings, a number of implications can be drawn. The significant influence of the schedule reliability factor (the first factor) on freight forwarder decisions implies that liner shipping companies should bring stronger commitment to this factor, that is, ensuring a reliably scheduled service, through for example, efficient management of shipping operations and operations risks. Given the high-risk nature of shipping and port operations, shipping lines should have risk management and emergency response plans. In addition, shipping lines should endeavour to provide cargo tracking services to their customers (Lam & van de Voorde 2011; Zhang & Lam 2014).

Regarding the second factor, documentation accuracy, shipping lines should have an error-free information process to help minimise the operational delay and costs

associated with errors in documentation and information processes. This is because of the role of shipping documents in international transactions (Tuna & Silan 2002; Wen & Lin 2015).

The third factor also strongly suggests freight rates as being a critical factor allowing carriers to compete with their rivals. Thus, shipping lines need to apply various pricing strategies to stay competitive and achieve their commercial goals. For example, they can use service bundling to differentiate their services. Similarly, customer loyalty programs and other (legally allowed) price discriminations can help them to retain customers and increase profit. To provide services at competitive freight rates, shipping lines should focus on improving efficiency, which can be achieved in a number of ways, such as by the use of advanced cargo handling and information management technologies, using larger ships, optimal speeds, efficient service routing and maintenance.

The fourth factor, service quality, suggests that shipping lines can compete through non-price based measures as well, by improving their service quality. This can be achieved in a number ways, such as quality control, customer service, market research, employee training.

The fifth factor, quick handling indicates that liner shipping companies can attract freight forwarders to their lines through on time berthing of ships on arrival, and quick handling of cargo to and from vessels (Raa, Dullaert & Van Schaeren 2011). Especially in Ghana ports where congestion and delays are common, freight forwarders perceived that the berthing of ships on arrival as important because most ships have to stay outside ports for days to await their turn, which affects the freight forwarders delivery plans.

The sixth factor, environment, indicates that forwarders are paying considerable attention to environmental issues when purchasing freight services from liner operators. Liner shipping companies can improve their competitiveness through environmental friendly operations. In recent times, most liner service buyers are critically evaluating how liner shipping companies are contributing to reducing CO₂ emissions before they offer cargo to their carriers (Lorange 2016).

The challenges faced by freight forwarders when selecting liner operators have implications on the market share and profitability of liner shipping companies. Ocean container carriers should endeavour to provide required services to freight forwarders in order to attract them to purchase their liner services. Ocean container carriers must work closely with freight forwarders to understand challenges faced by their customers in order for them to be able to respond to them in real-time. Some of the issues and concerns raised by freight forwarders when making decisions regarding the selection of ocean container carriers are the lack of real-time information on freight rates, transit times and the location of their cargo within the container supply chain. Thus, liner shipping companies which are ready to address such challenges faced by their customers must try their best to provide real-time information to their customers.

7.3 CONTRIBUTIONS OF THIS STUDY

The current study makes a number of contributions to theoretical research and also to more practical perspectives surrounding this field. Regarding theory, this thesis provides a better understanding of the influential factors affecting the competitiveness of ocean carriers. This study has been the first to use exploratory factor analysis and confirmatory factor analysis to analyse factors which influence the competitiveness of ocean container carriers from the perspective of freight forwarders. It also has focused on the context of Africa, using Ghana as a case study, in which no previous study has done.

The study's findings are expected to provide more insights into the relationship between ocean container carriers and freight forwarders. The conceptual framework developed by this study can be applied to other countries and sectors, including air, rail, inland water and road sectors. It also confirms salient factors in liner operator competitiveness, but unlike previous studies, it focuses on the perspective of freight forwarders (Brooks 1990, 1995; Coulter et al. 1989; Gailus & Jahn 2013; Lu 2003b, 2007; Shang & Lu 2012; Van den Berg, Roy & De Langen 2014a; Wen & Huang 2007; Yuen, Thai & Dahlgaard-Park 2015). Since freight forwarders' handled approximately 85% of international trade, the results of this

thesis will help liner operators to provide require services in order to attract cargo volume from them.

The results of this study are important to liner shipping companies because it will enable them to channel their resources into the right service areas to meet their customers' needs. The present study has revealed the views of actual decision makers regarding the choice of liner carrier, which none of the previous studies have provided for liner carriers.

The results of this study are important for researchers. They provide a much needed background for further research on country by country and cross-country approaches regarding selection factors affecting carrier choice solely from a freight forwarder's perspective. The findings of this study are also important for cargo owners, so they can deepen their understanding of how their representatives make decisions on their behalf. This could also serve to foster better collaboration and relationships between cargo owners and freight forwarders.

The findings of this study are important for stakeholders in the maritime sector in Africa, because this study is the first to conduct empirical research about carrier selection criteria in the African context, in particular in Ghana. Previously, all literature has been focused on carrier selection criteria from Europe, Asia and the United States.

This study has pointed out that despite an increase in freight rates in past years, freight forwarders still consider service quality related factors as more important than freight rates. The main reason for considering service related factors as important is due to their involvement in the planning of their clients' supply chain network.

This study employed first and second-order models to identify the weight of importance that freight forwarders attached to each factor and the model was refined from the first-order model to second-order model which to the best of author knowledge no study has ever used to analyse selection criteria of liner operators.

From the more practical point of view, the findings are expected to help liner shipping companies to improve their competitiveness and better develop relationships with freight forwarders, who are not only a main contributor to liner shipping company revenue, but they also have knowledge and insights into international shipping and supply chain operations. They also play a key role in connecting shipping lines with shippers and consignees.

The current research is also unique in the way that it focuses on how freight forwarders choose their ocean container carriers. It provide a step by step process of freight forwarders buying processes which ocean container carriers can use for their advantage. Understanding ocean container carrier selection and the competitiveness of liner shipping companies from the viewpoint of freight forwarders can enable liner shipping companies to formulate relevant strategies to increase their market share and improve their relationships with freight forwarders.

7.4 LIMITATIONS AND IMPLICATIONS FOR FUTURE RESEARCH

As an exploratory study on liner shipping competitiveness from the freight forwarder perspective, this study is subject to some limitations. First, due to resource and time constraints, the study could only focus on surveying freight forwarders in one country, Ghana. While responses obtained from the survey were more consistent due to the respondents being from the same country, the findings may not be fully generalizable to other countries, especially those with different industry settings than Ghana. The results of the study cannot therefore be automatically generalised to developed countries.

Second, although qualitative research was conducted to validate the results of the quantitative analysis (EFA and CFA), it was based on rather limited information collected from open-ended survey questions. In addition, the study could not survey liner operators, whose views could be compared with those of freight forwarders. Information and data on liner operators who work with the survey respondents could have been used to provide more insights into the relationship between shipping lines and freight forwarders. The same also applies to the

relationship between shippers and freight forwarders, given the role of the former, who would benefit directly from liner services.

Third, due to the time constraints of this PhD research the study is unable to conduct longitudinal research to examine how the perceived factors change overtime from the geographical and customers base perspectives.

There are a number of future research extensions of the present empirical study that could create more understanding of ocean container carrier selection from different geographical perspectives. First, future research could compare influential factors observed by freight forwarders from different regions, or even from within the same region there could be a comparison between countries. It could also extend the current study by surveying liner shipping companies or shippers, and compare their perspectives. Future research could focus on qualitative research, which would provide more in-depth understanding of the issues facing shippers/freight forwarders and their relationship with shipping lines.

Secondly, future studies should also take into consideration the characteristics of the freight forwarders. For example, freight forwarders should be considered according to their company sizes, as the larger companies tend to have more market power and therefore are able to negotiate with ocean container carriers for better freight rates and concessions. On the other hand, small freight forwarding companies tend to deal with ocean container carriers on a voyage-by-voyage basis instead of having long-term contracts with ocean container carriers. Thus, the views of freight forwarders may vary depending on their company sizes, and this could be taken up in future research.

Thirdly, future studies should compare competitiveness or service quality between individual liner shipping operators in Ghana to throw more light on how ocean carriers compete in Ghana.

Sixth, the future studies should compare the differences between views of developed and developing countries regarding carrier selection from the freight forwarders' perspective.

Finally, future research could evaluate the competitiveness of ocean container carriers from the supply chain perspective rather than the perspective of one chain player such as shippers and freight forwarders. It could consider the relationship between ocean container carriers and other actors within the container supply chain with a view to improving the performance of shipping lines within the chain, and within the competitiveness of the entire chain that shippers, exports and importers rely on for their business.

7.5 CONCLUSIONS

This study answered the research questions and achieved the research objectives, which were to examine factors influential to freight forwarders when they select ocean container carriers, and to investigate how those factors affect the competitiveness of liner shipping companies. It developed a conceptual framework for understanding freight forwarder buying behaviour and the factors they consider when buying freight services from liner operators. Based on the literature review in Chapter 2 as well as the conceptual framework, it then developed a survey questionnaire, which was used to collect data from Ghanaian freight forwarders. A total of 105 valid questionnaires were collected, representing 54.4%. Upon elimination of cases with unengaged responses, 103 cases were used in the final analysis.

Both exploratory factor analysis and confirmatory factor analysis were carried out to analyse freight forwarder decisions when selecting liner operators, and these were used to examine critical factors that influence the competitiveness of shipping lines. Both the first-order and second-order models were analysed with confirmatory factor analysis. A number of tests on data validity and reliability, variable relationships and model fit were also carried out. The survey also included open-ended questions, whose collected information was used to validate the findings of the factor analyses.

The data analysis found that schedule reliability, service quality, freight rate, document accuracy, quick handling, and environmental issues were the most important factors which influence the competitiveness of ocean container carriers

and the freight forwarder decisions made in selecting them. Schedule reliability was found to be the most important factor, followed by service quality, freight rate, documents accuracy, quick cargo handling and the environment. On the other hand, the environment factor was found to have the lowest effect on the competitiveness of shipping lines, which was interesting, but not surprising, given the survey targeted freight forwarders in Ghana, a developing country.

In addition, the open-ended findings were harmonious with the findings from the factor analysis, which revealed even more information on critical factors which determine the competitiveness of ocean container carriers. The analysis of the qualitative information provided findings that are similar to the quantitative analyses, while adding some insights regarding specific issues facing freight forwarders and how they can be addressed by ocean container carriers in order to improve their competitiveness. That is, through strategies that can be broadly divided into two categories, namely pricing and non-pricing competitive strategies (Esmer et al. 2016).

Overall the results of this study provide more insight into factors that influence and drive freight forwarders when they select liner shipping companies for cargo transportation, and ocean container carriers will need to address these issues to improve their competitiveness. Furthermore, the conceptual framework developed by this study can be extended to other sectors as well as the same sector in different countries.

While noting the contributions of this study, in conclusion, it is important to draw attention to recent studies by Gailus and Jahn (2015), Van den Berg, Roy and De Langen (2015) and Wen and Lin (2015), who have pointed out the importance of knowledge about ocean container carrier selection criteria and its application by ocean container carriers. Over the past 30 years, the processes of ocean carrier buying decisions have been useful for understanding the buying decisions of shipping line customers, including shippers, exporters, importers and their representative agents. This thesis has shown that understanding of the influential factors are essential for liner shipping companies market share increment and profit maximisation. Thus, it will enable liner operators to develop relevant

marketing strategies to win business from their competitors. Also demonstrated is that schedule reliability is the most influential factor perceived by the freight forwarders when choosing liner operator.

The world economy is growing and the maritime sector is constantly changing. The findings of this study have made a contribution to our understanding of shipping management which will help liner shipping companies to channel their resources into the right service areas and continue to serve and meet their customers' needs, drive international trade, and bring prosperity to the world.

REFERENCES

- Abdi, H 2003, 'Factor rotations in factor analyses', in M Lewis-Beck, A Bryman & T Futing (eds), *Encyclopedia for Research Methods for the Social Sciences* Sage, Thousand Oaks, CA.
- Abdullah, K, Jan, MT & Manaf, NHA 2012, 'A structural equation modelling approach to validate the dimensions of servperf in airline industry of Malaysia', *International Journal of Engineering and Management Sciences*, vol. 3, no. 2, pp. 134-141.
- Abshire, RD & Premeaux, SR 1991, 'Motor carrier selection criteria: Perceptual differences between shippers and carriers', *Transportation Journal*, vol. 31, no. 1, pp. 31-35.
- Adams, J, Khan, HT & Raeside, R 2014, *Research methods for business and social science students*, SAGE Publications India, Los Angeles.
- Aday, LA & Cornelius, LJ 2011, *Designing and conducting health surveys: A comprehensive guide*, Third edn, John Wiley & Sons, United State of America.
- Agentschap Netherlands 2015, *Sector report port development Ghana*, Embassy of The Kingdom of the Netherlands, The Netherlands, viewed 21/02/2016, <<http://ghana.nlbassade.org/binaries/content/assets/postenweb/g/ghana/ambassade-van-het-koninkrijk-der-nederlanden-in-accra/import/port-sector-report-2014-ghana-rvo.docx>>.
- Alizadeh, AH & Nomikos, NK 2011, 'Dynamics of the term structure and volatility of shipping freight rates', *Journal of Transport Economics and Policy*, vol. 45, no. 1, pp. 105-128.
- Allen, P, Bennett, K & Heritage, B 2014, *SPSS statistics version 22*, 3 edn, Cengage Learning, Australia.

Allen, WB, Mahmoud, MM & McNeil, D 1985, 'The importance of time in transit and reliability of transit time for shippers, receivers, and carriers', *Transportation Research Part B: Methodological*, vol. 19, no. 5, pp. 447-456.

Amaratunga, D, Baldry, D, Sarshar, M & Newton, R 2002, 'Quantitative and qualitative research in the built environment: Application of "mixed" research approach', *Work study*, vol. 51, no. 1, pp. 17-31.

Amaruchkul, K, Cooper, WL & Gupta, D 2011, 'A note on air-cargo capacity contracts', *Production and Operations Management*, vol. 20, no. 1, pp. 152-162.

Amaruchkul, K & Lorchirachoonkul, V 2011, 'Air-cargo capacity allocation for multiple freight forwarders', *Transportation Research Part E: Logistics and Transportation Review*, vol. 47, no. 1, pp. 30-40.

Andresen, M, Hollensen, S & Kahle, L 2013, 'Industrial buying behavior related to human resource consulting services', *IUP Journal of Marketing Management*, vol. 12, no. 3, pp. 27-51.

Angelidis, T & Skiadopoulos, G 2008, 'Measuring the market risk of freight rates: A value-at-risk approach', *International Journal of Theoretical and Applied Finance*, vol. 11, no. 5, pp. 447-469.

Appeals, T & de Swielande, HS 1998, 'Rolling back the frontiers: The customs clearance revolution', *International Journal of Logistics Management, The*, vol. 9, no. 1, pp. 111-118.

Arber, S 2001, 'Designing samples', in N Gilbert (ed.), *Researching social life*, Second edn, Sage Publications, London, pp. 58-82.

Armstrong, JS & Overton, TS 1977, 'Estimating nonresponse bias in mail surveys', *Journal of Marketing Research*, vol. 14, no. 3, pp. 396-402.

Arvis, J-F, Duval, Y, Shepherd, B, Utoktham, C & Raj, A 2016, 'Trade costs in the developing world: 1996–2010', *World Trade Review*, vol. 15, no. 3, pp. 451-474.

Arvis, J-F, Mustra, MA, Panzer, J, Ojala, L & Naula, T 2007, 'Connecting to compete: Trade logistics in the global economy', in Communications Development Incorporated (ed.), World Bank. Washington, DC., US, pp. 53-65, viewed 12/01/2014, <<http://www.worldbank.org/lpi>>.

Australian Government 2007a, 'Australian Code for the Responsible Conduct of Research, The National Health and Medical Research Council ', in Australia Research Council, Canberra.

Australian Government 2007b, *National Statement on Ethical Conduct in Human Research, The National Health and Medical research Council, Australian Research Council & Australian Vice-Chancellors' Committee*, Canberra.

Baatard, G 2015, 'A technical guide to designing and implementing effective web surveys', *Leading Issues in Business and Management Research*, vol. 2, no. 1, pp. 48-54.

Babbie, E 2015, *The practice of social research*, Fourteenth edn, Cengage Learning, Boston, United States of America.

Bagchi, PK 1989, 'Carrier selection: The analytic hierarchy process', *Logistics and Transportation Review*, vol. 25, no. 1, pp. 63-73.

Baker, MJ & Parkinson, ST 2016, *Organizational buying behaviour: Purchasing and marketing management implications*, Springer, New York.

Bandara, YMS 2015, 'Influential factors in seaport infrastructure pricing', Doctorate thesis, Australia Maritime College.

Banomyong, R & Supatn, N 2011, 'Selecting logistics providers in Thailand: A shippers' perspective', *European Journal of Marketing*, vol. 45, no. 3, pp. 419-437.

Bardi, EJ 1973, 'Carrier selection from one mode', *Transportation Journal*, vol. 13, no. 1, pp. 23-29.

Bardi, EJ, Bagchi, PK & Raghunathan, T 1989, 'Motor carrier selection in a deregulated environment', *Transportation Journal*, vol. 29, no. 1, pp. 4-11.

Becker, B & Dill, N 2007, 'Managing the complexity of air cargo revenue management', *Journal of Revenue & Pricing Management*, vol. 6, no. 3, pp. 175-187.

Bellizzi, JA & McVey, P 1983, 'How valid is the buy-grid model?', *Industrial Marketing Management*, vol. 12, no. 1, pp. 57-62.

Ben-Akiva, M, Bolduc, D & Park, JQ 2013, 'Discrete choice analysis of shippers' preferences', in M Ben-Akiva, H Meersman & E Van de Voorde (eds), *Freight Transport Modelling*, First edn, Emerald Group Publishing Limited, UK, pp. 121-141.

Bernhofen, DM, El-Sahli, Z & Kneller, R 2016, 'Estimating the effects of the container revolution on world trade', *Journal of International Economics*, vol. 98, no. 1, pp. 36-50.

Bettman, JR & Park, CW 1980, 'Effects of prior knowledge and experience and phase of the choice process on consumer decision processes: A protocol analysis', *Journal of consumer research*, vol. 7, no. 3, pp. 234-248.

Bhardwaj, S 2013, 'Challenges and potential of technology integration in modern ship management practices', PhD thesis, Plymouth University.

Bhatnagar, R & Teo, C-C 2009, 'Role of logistics in enhancing competitive advantage: A value chain framework for global supply chains', *International Journal of Physical Distribution & Logistics Management*, vol. 39, no. 3, pp. 202-226.

Bichou, K 2011, 'Assessing the impact of procedural security on container port efficiency', *Maritime Economics & Logistics*, vol. 13, no. 1, pp. 1-28.

Bichou, K & Gray, R 2004, 'A logistics and supply chain management approach to port performance measurement', *Maritime Policy & Management*, vol. 31, no. 1, pp. 47-67.

Bird, J & Bland, G 1988, 'Freight forwarders speak: The perception of route competition via seaports in the European Communities Research Project. Part 1', *Maritime Policy & Management*, vol. 15, no. 1, pp. 35-55.

Bloor, M, Sampson, H, Baker, S, Walters, D, Dahlgren, K, Wadsworth, E & James, P 2013, 'Room for manoeuvre? Regulatory compliance in the global shipping industry', *Social & Legal Studies*, vol. 22, no. 2, pp. 171-189.

Boile, M, Lee, H & Theofanis, S 2012, 'Hierarchical interactions between shippers and carriers in international maritime freight transportation networks', *Procedia-Social and Behavioral Sciences*, vol. 48, no. 1, pp. 3651-3660.

Bolduc, M-C, Renaud, J & Boctor, F 2007, 'A heuristic for the routing and carrier selection problem', *European Journal of Operational Research*, vol. 183, no. 2, pp. 926-932.

Bonett, DG & Wright, TA 2015, 'Cronbach's alpha reliability: Interval estimation, hypothesis testing, and sample size planning', *Journal of Organizational Behavior*, vol. 36, no. 1, pp. 3-15.

Boone, HN & Boone, DA 2012, 'Analyzing Likert data', *Journal of Extension*, vol. 50, no. 2, pp. 1-5.

Botella, J & Suero, M 2015, 'Managing heterogeneity of variance in studies of reliability generalization with alpha coefficients', *Methodology*, vol. 8, no. 2, pp. 71-80.

Bottani, E & Rizzi, A 2006, 'A fuzzy TOPSIS methodology to support outsourcing of logistics services', *Supply Chain Management: An International Journal*, vol. 11, no. 4, pp. 294-308.

Bowen, J & Leinbach, T 2004, 'Market concentration in the air freight forwarding industry', *Journal of Economic and Social Geography*, vol. 95, no. 2, pp. 174-188.

Braden, D & Sue, A 2016, *Hanjin shipping bankruptcy*, Journal of Commerce, viewed 15/Sep/2016, <<http://www.ioc.com/special-topics/hanjin-shipping-bankruptcy>>.

Branch, AE & Robarts, M 2014, *Elements of shipping*, 9TH edn, Routledge, London.

Brooks, MR 1983, 'Determinants of shipper's choice of container carrier: A study of Eastern Canadian Exporters', PhD thesis, University of Wales Institute of Science Technology.

Brooks, MR 1984, 'An alternative theoretical approach to the evaluation of liner shipping: Part I. Situational factors', *Maritime Policy and Management*, vol. 11, no. 1, pp. 35-43.

Brooks, MR 1985, 'An alternative theoretical approach to the evaluation of liner shipping Part II. Choice criteria', *Maritime Policy and Management*, vol. 12, no. 2, pp. 145-155.

Brooks, MR 1990, 'Ocean carrier selection criteria in a new environment', *Logistics and Transportation Review*, vol. 26, no. 4, pp. 339-355.

Brooks, MR 1991, 'Assessment of the ocean carrier decision environment: A longitudinal study', *Journal of the Transportation Research Forum*, vol. 31, no. 2, pp. 219-229.

Brooks, MR 1995, 'Understanding the ocean container market a seven country study [1]', *Journal of the History of Economic Thought*, vol. 22, no. 1, pp. 39-49.

Brooks, MR, Puckett, SM, Hensher, DA & Sammons, A 2012, 'Understanding mode choice decisions: A study of Australian freight shippers', *Maritime Economics & Logistics*, vol. 14, no. 3, pp. 274-299.

Brooks, MR & Trifts, V 2008, 'Short sea shipping in North America: Understanding the requirements of Atlantic Canadian shippers', *Maritime Policy & Management*, vol. 35, no. 2, pp. 145-158.

Brown, TA 2014, *Confirmatory factor analysis for applied research*, Second edn, Guilford Publications, United States of America.

Brown, TA 2015, *Confirmatory factor analysis for applied research*, Second edn, Guilford Publications, New York, United States of America.

Bryman, A 2012, 'Social research methods', in A Bryman (ed.), 4th edn, Oxford University Press, United States.

Bryman, A & Bell, E 2015, *Business research methods*, Fourth edn, Oxford university press, United States of America.

Burkovskis, R 2008, 'Efficiency of freight forwarder's participation in the process of transportation', *Transport*, vol. 23, no. 3, pp. 208-213.

Byrne, BM 2013, *Structural equation modeling with AMOS: Basic concepts, applications, and programming*, Second edn, Routledge, New York, USA.

Cain, P 2014, 'Complexity, confusion and the multifaceted legal roles of the international freight forwarder', *Macquarie Law Journal*, pp. 25-45.

Campbell, DT & Fiske, DW 1959, 'Convergent and discriminant validation by the multitrait-multimethod matrix', *Psychological Bulletin*, vol. 56, no. 2, pp. 81-105.

Campbell, NC 1985, 'An interaction approach to organizational buying behavior', *Journal of Business Research*, vol. 13, no. 1, pp. 35-48.

Cariou, P 2011, 'Is slow steaming a sustainable means of reducing CO₂ emissions from container shipping?', *Transportation Research Part D: Transport and Environment*, vol. 16, no. 3, pp. 260-264.

Carvalho, JO, Ready, RE, Malloy, P & Grace, J 2013, 'Confirmatory factor analysis of the Frontal Systems Behavior Scale (FrSBe)', *Assessment*, vol. 20, no. 10, pp. 1-10.

Catram Consultants 2014, *Market study on container terminals in West and Central Africa*, MLTC/CATRAM, Agence Francaise de Developpement, viewed

23/01/2015,

<http://www.afd.fr/webdav/shared/ELEMENTS_COMMUNS/pdf/MLTC_CATRAM_market_study_container_terminals_West_and_Central_Africa.pdf>.

Cavalcante, RA & Roorda, MJ 2013, 'Shipper/carrier interactions data collection: Web-based respondent customized stated preference (WRCSP) survey', in J Zmud, M Lee-Gosselin, M Munizaga & JA Carrasco (eds), *Transport Survey Methods: Best Practice for Decision Making*, First edn, Emerald Group Publishing Limited, UK, pp. 257-277.

Central Intelligence Agency 2016, *Country comparison to the world*, The World Factbook, viewed 20/04/2016, <<https://www.cia.gov/library/publications/the-world-factbook/fields/2147.html>>.

Chang, T-S 2008, 'Best routes selection in international intermodal networks', *Computers & Operations Research*, vol. 35, no. 9, pp. 2877-2891.

Chao, S-L & Chen, B-C 2014, 'Effects of switching costs on customer loyalty in the liner shipping industry', *Maritime Economics & Logistics*, vol. 17, no. 3, pp. 341-358.

Chen, FF, Sousa, KH & West, SG 2005, 'Teacher's corner: Testing measurement invariance of second-order factor models', *Structural Equation Modeling: A Multidisciplinary Journal*, vol. 12, no. 3, pp. 471-492.

Chen, FF, West, SG & Sousa, KH 2006, 'A comparison of bifactor and second-order models of quality of life', *Multivariate Behavioral Research*, vol. 41, no. 2, pp. 189-225.

Chen, K-K, Wang, J-S, Chu, C-W & Chiu, R-H 2010, 'Improving service performance for an international container shipping company using index approach: A method and applications', *Journal of Marine Science and Technology*, vol. 18, no. 5, pp. 759-770.

Cheung, RK, Tong, JH & Slack, B 2003, 'The transition from freight consolidation to logistics: The case of Hong Kong', *Journal of Transport Geography*, vol. 11, no. 4, pp. 245-253.

Chou, C-C 2010, 'Application of FMCDM model to selecting the hub location in the marine transportation: A case study in southeastern Asia', *Mathematical and Computer Modelling*, vol. 51, no. 5, pp. 791-801.

Chow, HKH, Choy, KL & Lee, WB 2007, 'A strategic knowledge-based planning system for freight forwarding industry', *Expert Systems with Applications*, vol. 33, no. 4, pp. 936-954.

Chu, H-C 2014, 'Exploring preference heterogeneity of air freight forwarders in the choices of carriers and routes', *Journal of Air Transport Management*, vol. 37, pp. 45-52.

Chuah, KH & Yingling, JC 2005, 'Routing for a just-in-time supply pickup and delivery system', *Transportation Science*, vol. 39, no. 3, pp. 328-339.

Chung, C-C & Chiang, C-H 2011, 'The critical factors: An evaluation of schedule reliability in liner shipping', *International Journal of Operations Research*, vol. 8, no. 4, pp. 3-9.

Chung, C-C, Chung, Y-S & Tai, A-N 2011, 'An evaluation of key service attributes of ocean container carriers from the ocean freight forwarder's perspective', *Journal of the Eastern Asia Society for Transportation Studies*, vol. 9, no. 1, pp. 605-620.

Churchill, GA & Iacobucci, D 2010, 'Marketing research: Methodological foundations', in The Dryden Press, New York.

Cobanoglu, C, Warde, B & Moreo, PJ 2001, 'A comparison of mail, fax and web-based survey methods', *International Journal of Market Research*, vol. 43, no. 4, pp. 441-452.

Cohen, L, Manion, L & Morrison, K 2007, *Research methods in education*, Sixth Edition edn, The Higher Education Academy Innovation Way, York Science Park, Heslington, York YO10 5BR, London.

Cohen, MA & Lieberman, M 1949, 'Collective bargaining in the motor freight industry', *Industrial and Labor Relations Review*, vol. 1, no. 1, pp. 547-555.

Cook, WR 1967, 'Transport decisions of certain firms in the black country', *Journal of Transport Economics and Policy*, vol. 1, no. 3, pp. 325-344.

Cooper, DR & Schindler, PS 2006, *Business research methods*, Tenth edn, The McGraw-Hill/Irwin, USA.

Coppersmith, C 2003, 'Airlines, forwarders must work together', *Journal of Commerce*, vol. 4, no. 11, pp. 38-51.

Corbett, JJ, Wang, H & Winebrake, JJ 2009, 'The effectiveness and costs of speed reductions on emissions from international shipping', *Transportation Research Part D: Transport and Environment*, vol. 14, no. 8, pp. 593-598.

Costello, AB & Osborne, JW 2005, 'Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis', *Practical Assessment, Research & Evaluation*, vol. 10, no. 7, pp. 1-9.

Coulter, RL, Darden, WR, Coulter, MK & Brown, G 1989, 'Freight transportation carrier selection criteria: Identification of service dimensions for competitive positioning', *Journal of Business Research*, vol. 19, no. 1, pp. 51-66.

Creswell, JW 2013, *Research design: Qualitative, quantitative, and mixed methods approaches*, Fourth edn, Sage Publications, USA.

Creswell, JW & Clark, VLP 2007, *Designing and conducting mixed methods research*, 2ND edn, Sage Publications, Inc, United States of America.

Cronbach, LJ 1951, 'Coefficient alpha and the internal structure of tests', *Psychometrika*, vol. 16, no. 3, pp. 297-334.

-
- Crum, MR & Allen, BJ 1997, 'A longitudinal assessment of motor carrier-shipper relationship trends, 1990 vs. 1996', *Transportation Journal*, vol. 37, no. 1, pp. 5-17.
- Cunningham, BK 2014, 'Social research design framework for integration philosophical and practical elements', *Nurse Researcher*, vol. 22, no. 1, pp. 32-37.
- Cunningham, MT & Kettlewood, K 1976, 'Source loyalty in the freight transport market', *European Journal of Marketing*, vol. 10, no. 1, pp. 60-79.
- D'este, G & Meyrick, S 1989, 'More than the bottom line: How users select a shipping service', in *Australasian Transport Research Forum*, Australia, vol. 1, pp. 65-81.
- D'este, G & Meyrick, S 1992, 'Carrier selection in a RO/RO ferry trade Part 1. Decision factors and attitudes', *Maritime Policy & Management*, vol. 19, no. 2, pp. 115-126.
- Da Cruz, MRP, Ferreira, JJ & Azevedo, SG 2013, 'Key factors of seaport competitiveness based on the stakeholder perspective: An Analytic Hierarchy Process (AHP) model', *Maritime Economics & Logistics*, vol. 15, no. 4, pp. 416-443.
- Daas, P & Arends-Tóth, J 2009, 'Secondary data collection', in *Methodology Series*, Statistics Netherlands, Netherlands, pp. 1-42.
- Das, C 1974, 'Choice of transport service: An inventory theoretic approach', *Logistics and Transportation Review*, vol. 10, no. 2, pp. 181-187.
- Daughety, AF & Inaba, FS 1977, 'Modelling service-differentiated demand for freight transportation: Theory, regulatory policy analysis, demand estimation [Includes estimation of demand for transportation of grain in the USA]', in *PB-US National Technical Information Service (USA)*, USA, pp. 42-54.
- Davies, G & Gunton, C 1983, 'The buying of freight services: The implications for marketers', *The Quarterly Review of Marketing*, vol. 8, no. 3, pp. 1-10.

Davies, MB & Hughes, N 2014, 'Doing a successful research project: Using qualitative or quantitative methods', in Second edn, Palgrave Macmillan, London, pp. 216-232.

De Jong, G, Kouwenhoven, M, Bates, J, Koster, P, Verhoef, E, Tavasszy, L & Warffemius, P 2014, 'New SP-values of time and reliability for freight transport in the Netherlands', *Transportation Research Part E: Logistics and Transportation Review*, vol. 64, no. 1, pp. 71-87.

De Vaus, D 2013, *Surveys in social research*, Sixth edn, Routledge, Australia.

Deepen, JM 2007, *Logistics outsourcing relationships: Measurement, antecedents, and effects of logistics outsourcing performance*, Springer, New York.

DeLain, L & O'Meara, E 2004, 'Building a business case for revenue management', *Journal of Revenue and Pricing Management*, vol. 2, no. 4, pp. 368-377.

Denscombe, M 2014, *The good research guide: For small-scale social research projects*, Fifth edn, McGraw-Hill Education (UK), England.

Denzin, NK & Lincoln, YS 2011, *The SAGE handbook of qualitative research*, Sage, Thousand Oaks, California.

Dicken, P 2003, *Global shift: Reshaping the global economic map in the 21st century*, Fourth edition edn, Sage, London.

Dillman, DA 2011, *Mail and internet surveys: The tailored design method-2007 update with new internet, visual, and mixed-mode guide*, Second edn, John Wiley & Sons, USA.

Dimitrov, DM 2014, 'Statistical methods for validation of assessment scale data in counseling and related fields', in John Wiley & Sons, United States of America.

Ding, J-F 2010, 'Critical factors influencing customer value for global shipping carrier-based logistics service providers using Fuzzy AHP approach', *African Journal of Business Management*, vol. 4, no. 7, pp. 1299-1307.

Ding, J-F, Dye, C-Y, Liang, S-Y, Chou, C-C, Tseng, W-J & Shyu, W-H 2016, 'Evaluating key factors influencing the development of multi-country consolidation for ocean freight forwarders in Taiwan', in *Proceedings of the Institution of Mechanical Engineers, Part M: Journal of Engineering for the Maritime Environment*, pp. 1-11.

Ding, J-F, Tseng, W-J & Hsu, F-T 2013, 'An evaluation of key risk factors affecting shipping market operations across the Taiwan strait for liner carriers', in *Proceedings of the Institution of Mechanical Engineers, Part M: Journal of Engineering for the Maritime Environment*, pp. 1-10.

Djankov, S, Freund, C & Pham, CS 2010, 'Trading on time', *The Review of Economics and Statistics*, vol. 92, no. 1, pp. 166-173.

Dobie, K 2005, 'The core shipper concept: a proactive strategy for motor freight carriers', *Transportation Journal*, vol. 44, no. 2, pp. 37-53.

Dolnicar, S, Laesser, C & Matus, K 2009, 'Online versus paper format effects in tourism surveys', *Journal of Travel Research*, vol. 47, no. 3, pp. 295-316.

Drewry Consultancy 2016, *Shipping oversupply to persist despite big scrapping plans* -Drewry, Reuters, viewed 18/07/2016, <<http://www.reuters.com/article/shipping-scrapping-idUSL8N1A41NS>>.

Ducruet, C & Notteboom, TE 2012, 'The worldwide maritime network of container shipping: Spatial structure and regional dynamics', *Global Networks*, vol. 12, no. 3, pp. 395-423.

Ducruet, C & Van Der Horst, MR 2009, 'Transport integration at European ports', *European Journal of Transport and Infrastructure Research*, vol. 9, no. 2, pp. 121-142.

Durvasula, S, Lysonski, S & Mehta, SC 2000, 'Business-to-business marketing service recovery and customer satisfaction issues with ocean shipping lines', *European Journal of Marketing*, vol. 34, no. 3/4, pp. 433-452.

Easterby-Smith, M, Thorpe, R & Jackson, P 2012, *Management research*, 4th edn, SAGE Publications Ltd, London.

Eide, MS, Longva, T, Hoffmann, P, Endresen, Ø & Dalsøren, SB 2011, 'Future cost scenarios for reduction of ship CO2 emissions', *Maritime Policy & Management*, vol. 38, no. 1, pp. 11-37.

Eng-Larsson, F & Kohn, C 2012, 'Modal shift for greener logistics-the shipper's perspective', *International Journal of Physical Distribution & Logistics Management*, vol. 42, no. 1, pp. 36-59.

Engelen, S, Norouzzadeh, P, Dullaert, W & Rahmani, B 2011, 'Multifractal features of spot rates in the liquid petroleum gas shipping market', *Energy Economics*, vol. 33, no. 1, pp. 88-98.

Esmer, S, Nguyen, H-O, Bandara, YM & Yeni, K 2016, 'Non-price competition in the port sector: A case study of ports in Turkey', *The Asian Journal of Shipping and Logistics*, vol. 32, no. 1, pp. 3-11.

Eun, W & Seo, Y 2013, 'Research about ways to improve air freight logistic process through analyzing air freight logistics cost', *Advanced Science and Technology Letters*, vol. 34, no. 1, pp. 34-37.

European Commission 2011, *Freight integrators*, European Commission, viewed 17/07/2014, 2014, <http://ec.europa.eu/transport/logistics/documentation/freight_integrators/doc/final_report_freight_integrators.pdf>.

European Commission 2014, *European Union, Trade in goods with Ghana*, European Commission, viewed 21/09/2015, <http://trade.ec.europa.eu/doclib/docs/2006/september/tradoc_122461.pdf>.

Evans, RE & Southard, WR 1974, 'Motor carriers' and shippers' perceptions of the carrier choice decision', *Logistics and Transportation Review*, vol. 10, no. 2, pp. 145-147.

Fabrigar, LR, Wegener, DT, MacCallum, RC & Strahan, EJ 1999, 'Evaluating the use of exploratory factor analysis in psychological research', *Psychological Methods*, vol. 4, no. 3, pp. 272-299.

Fanam, PD, Nguyen, H-O & Cahoon, S 2015, 'Analysis of liner operators' competitiveness: Methodological issues and framework', in *IAME 2015 conference*, Malaysia, pp. 1-25.

Fanam, PD, Nguyen, H-O & Cahoon, S 2016, 'An empirical analysis of the influential factors affecting ocean carriers competitiveness: Freight forwarders' perspective', in *International Association of Maritime Economists*, Hamburg, Germany, pp. 1-21.

Fawcett, SE & Birou, LM 1992, 'Exploring the logistics interface between global and JIT sourcing', *International Journal of Physical Distribution & Logistics Management*, vol. 22, no. 1, pp. 3-14.

Fédération Internationale des Associations de Transitaires et Assimilés 2011, *Fiata model rules for freight forwarding services*, FIATA, viewed 22/03/2014, <https://hu.kuehne.nagel.com/fileadmin/country_page_structure/EE/Hungary/Documents/FIATA_model_rules_szabalyzat.pdf>.

Feo, M, Espino, R & García, L 2011, 'An stated preference analysis of Spanish freight forwarders modal choice on the south-west Europe motorway of the sea', *Transport Policy*, vol. 18, no. 1, pp. 60-67.

Fink, C, Mattoo, A & Neagu, IC 2002, 'Trade in international maritime services: How much does policy matter?', *The World Bank Economic Review*, vol. 16, no. 1, pp. 81-108.

Flitsch, V & Jahn, C 2014, 'Maritime supply chain choices by freight forwarders in container shipping', paper presented to International Association of Maritime Economists Norfolk, VA, USA.

Foster, JR & Strasser, S 1990, 'Carrier/modal selection factors: The shipper/carrier paradox', *Journal of the Transportation Research Forum*, vol. 31, no. 1, pp. 206-212.

Fowler Jr, FJ 2013, *Survey research methods*, Fifth edn, Sage publications, United States of America.

Frankel, EG 1993, 'Total quality management in liner shipping', *Marine Policy*, vol. 17, no. 1, pp. 58-63.

Fransoo, JC & Lee, CY 2013, 'The critical role of ocean container transport in global supply chain performance', *Production and Operations Management*, vol. 22, no. 2, pp. 253-268.

Frémont, A 2009, 'Shipping lines and logistics', *Transport Reviews*, vol. 29, no. 4, pp. 537-554.

Fusillo, M 2004, 'Is liner shipping supply fixed?', *Maritime Economics & Logistics*, vol. 6, no. 3, pp. 220-235.

Gailus, S & Jahn, C 2013, 'Ocean container carrier selection in north western Europe—qualitative empirical research towards a discrete choice model', in T Blecker, W Kersten & CM Ringle (eds), *Pioneering Solutions in Supply Chain Performance Management*, EUL Verlag Lohmar, pp. 69-88.

Gailus, S & Jahn, C 2015, 'Ocean container carrier selection processes', in J Dethloff, H-D Haasis, H Kopfer, H Kotzab & J Schonberger (eds), *Logistics Management*, Springer, Germany, pp. 239-250.

Gallagher, TL 2010, *More ocean carriers fall behind schedule*, The Journal of Commerce Online, viewed 22/08/2011 2011, <http://www.joc.com/maritime-news/more-ocean-carriers-fall-behind-schedule_20100316.html>.

Ganbat, E & Kim, H-S 2015, 'Empirical study of multimodal transport route choice model in freight transport between Mongolia and Korea', *Journal of the Korea Institute of Navigation and Port*, vol. 39, no. 5, pp. 409-415.

Gao, Z & Yoshida, S 2013, 'Analysis on industrial structure and competitive strategies in liner shipping industry', *Journal of Management and Strategy*, vol. 4, no. 4, pp. 12-20.

Gaskin, J 2013a, *Exploratory factor analysis*, Youtube, viewed 24/08/2015, <<https://www.youtube.com/watch?v=X-O-OcJPCe8>>.

Gaskin, J 2013b, *Exploratory factor analysis data screening* Youtube, viewed 08/08/2015, <<https://www.youtube.com/watch?v=1KuM5e0aFgU>>.

Gaskin, J 2013c, *SEM series: Confirmatory factor analysis*, Youtube, viewed 21/08/2015, <<https://www.youtube.com/watch?v=MCYmyzRZnIY>>.

Gaskin, J 2016, *SEM series: Confirmatory factor analysis part 2*, Youtube, viewed 10/10/2016, <<https://www.youtube.com/watch?v=CFBUECZgUuo&spfreload=1>>.

Ghana Customs Excise and Preventive Service 1993, 'P.N.D.C. Law 330', *Ghana Customs Management*, pp. 130-155.

Ghana Institute of Freight Forwarders 2015, *Architects of Ghana's international tradeways*, Ghana Institute of Freight Forwarders, viewed 01/05/2015, <<http://www.ghanafreightforwarders.org/>>.

Ghana Institute of Freight Forwarders 2016, *Looking beyond our national borders*, Ghana Institute of Freight Forwarders, viewed 23/03/2016 2016, <<http://www.ghanafreightforwarders.org/>>.

Ghana Ports and Harbour Authority 2014, *Ghana port to triple capacity with \$1.5 billion expansion*, *Journal of Commerce*, viewed 23/11/2015 2015, <http://www.joc.com/port-news/international-ports/ghana-port-triple-capacity-15-billion-expansion_20141118.html>.

Ghana Ports and Harbour Authority 2015, *Ghana ups the ante*, Ghana Ports and Harbour Authority, viewed 22/03/2016 2016, <<http://ghanaports.gov.gh/news/1092/GHANA-UPS-THE-ANTE->>.

Ghana Ports and Harbour Authority 2017, Port statistics, Ghana Ports and Harbour Authority, Viewed 11/05/2017 <<http://www.ghanaports.gov.gh/Files/TEMAPORT/tema%20PORT%20PERFORMANCE%202003%202016-1.pdf>>.

Ghana Statistical Service 2016, *Ghana gross domestic product annual growth rate*, Trading Economics, viewed 23/09/2016, <<http://www.tradingeconomics.com/ghana/gdp-growth-annual>>.

Gibson, BJ, Rutner, SM & Keller, SB 2002, 'Shipper-carrier partnership issues, rankings and satisfaction', *International Journal of Physical Distribution & Logistics Management*, vol. 32, no. 8, pp. 669-681.

Glass, DA 2013, *Freight forwarding and multi modal transport contracts*, Second edn, Taylor & Francis, United Kingdom.

Gligor, DM & Holcomb, MC 2014, 'Antecedents and consequences of integrating logistics capabilities across the supply chain', *Transportation Journal*, vol. 53, no. 2, pp. 211-234.

Goldberg, D 1990, 'JIT's next step: Moves cargo and data', *Transportation & Distribution*, vol. 31, no. 13, pp. 26-29.

Gotzamani, K, Longinidis, P & Vouzas, F 2010, 'The logistics services outsourcing dilemma: Quality management and financial performance perspectives', *Supply Chain Management: An International Journal*, vol. 15, no. 6, pp. 438-453.

Gouvernal, E & Slack, B 2012, 'Container freight rates and economic distance: A new perspective on the world map', *Maritime Policy & Management*, vol. 39, no. 2, pp. 133-149.

Grainger, A 2014, *Measuring-up customs: A trade compliance cost perspective*, Nottingham University Business School viewed 25/02 2015, <<http://ssrn.com/abstract=2395325>>.

Gray, DE 2013, *Doing research in the real world*, Third edn, Sage Publication Ltd, London.

Greener, S 2008, *Business research methods*, ed. S Greener, BookBoon, United Kingdom.

Griffis, SE, Goldsby, TJ & Cooper, M 2003, 'Web-based and mail surveys: A comparison of response, data, and cost', *Journal of Business Logistics*, vol. 24, no. 2, pp. 237-258.

Grosso, M 2011, *Variables influencing transport mode choice: A generalized costs approach*, Società Italiana di Economia dei Trasporti e della Logistica, Italy.

Grosso, M & Monteiro, F 2008, 'Relevant strategic criteria when choosing a container port-the case of the port of Genoa', in *Research in Transport and Logistics*, pp. 299-306.

Grove, S & Burns, N 2005, *The practice of nursing research: Conduct, critique, & utilization*, 5th edn, Missouri: Elsevier Saunders.

Guo, Y, Peeta, S & Mannering, F 2016, 'Rail-truck multimodal freight collaboration: A statistical analysis of freight-shipper perspectives', *Transportation Planning and Technology*, pp. 1-23.

Gupta, D 2008, 'Flexible carrier-forwarder contracts for air cargo business', *Journal of Revenue & Pricing Management*, vol. 7, no. 4, pp. 341-356.

Gurning, SRO 2011, 'Maritime disruptions in the Australian-Indonesian wheat supply chain: An analysis of risk assessment and mitigation strategies', Doctorate thesis, University of Tasmania.

Guy, E & Urli, B 2006, 'Port selection and multicriteria analysis: An application to the Montreal-New York alternative', *Maritime Economics & Logistics*, vol. 8, no. 2, pp. 169-186.

Ha, B-C, Park, Y-K & Cho, S 2011, 'Suppliers' affective trust and trust in competency in buyers: its effect on collaboration and logistics efficiency', *International Journal of Operations & Production Management*, vol. 31, no. 1, pp. 56-77.

Hair, JF, Black, WC, Babin, BJ & Anderson, RE 2010, *Multivariate data analysis*, 7 edn, Prentice Hall, Englewood Cliffs, NJ, USA.

Hao, H, Geng, Y & Ou, X 2015, 'Estimating CO₂ emissions from water transportation of freight in China', *International Journal of Shipping and Transport Logistics*, vol. 7, no. 6, pp. 676-694.

Haralambides, HE & Acciaro, M 2010, *Bundling transport and logistics services in global supply chains*, International Handbook of Maritime Business, Edward Elgar Publishing, UK.

Haralambides, HE, Cariou, P & Benacchio, M 2002, 'Costs, benefits and pricing of dedicated container terminals', *International Journal of Maritime Economics*, vol. 4, no. 1, pp. 21-34.

Harrison, A & Fichtinger, J 2013, 'Managing variability in ocean shipping', *International Journal of Logistics Management*, The, vol. 24, no. 1, pp. 7-21.

Haughton, MA & Desmeules, R 2001, 'Recent reforms in customs administrations', *International Journal of Logistics Management*, vol. 12, no. 1, pp. 65-82.

Heaver, TD 2010, *The response of liner shipping companies to the evolution of global supply chain management*, 2nd Edition edn, The handbook of maritime economics and business, The Grammenos Library, UK.

Hellermann, R 2006, *Capacity options for revenue management*, Springer, Germany.

Hesse, M & Rodrigue, J-P 2004, 'The transport geography of logistics and freight distribution', *Journal of Transport Geography*, vol. 12, no. 3, pp. 171-184.

Hill, DJ 1972, *Freight forwarders*, First edn, Stevens & Sons, London.

Hoffman, A & Bhero, E 2015, 'A simulation approach to the optimized design of cross-border operations', in *18th International Conference on Intelligent Transportation Systems*, Las Palmas, pp. 1416-1423.

Hoffman, AJ, Lusanga, K & Bhero, E 2013, 'A combined GPS/RFID system for improved cross-border management of freight consignments', in *AFRICON, 2013*, South Africa, pp. 1-8.

Holcomb, MC & Manrodt, KB 2000, 'The shippers' perspective: Transportation and logistics trends and issues', *Transportation Journal*, vol. 40, no. 1, pp. 15-25.

Holguín-Veras, J, Xu, N, De Jong, G & Maurer, H 2011, 'An experimental economics investigation of shipper-carrier interactions in the choice of mode and shipment size in freight transport', *Networks and Spatial Economics*, vol. 11, no. 3, pp. 509-532.

Holloway, IC 1986, 'Troubled waters: The liability of a freight forwarder as a principal under Anglo-Canadian law', *Journal Maritime Law & Commerce*, vol. 17, no. 2, p. 244.

Hong, J, Chin, AT & Liu, B 2004, 'Logistics outsourcing by manufacturers in China: A survey of the industry', *Transportation Journal*, vol. 43, no. 1, pp. 17-25.

Hopkins, WG 2008, 'Quantitative research design', *Sportscience*, vol. 4, no. 1, pp. 1-3.

Horn, C 2010, 'Airports and territory: Emergence of a new strategic actor in the air transport system', PhD thesis, Université Paris-Est.

Howe, LD, Tilling, K, Galobardes, B & Lawlor, DA 2013, 'Loss to follow-up in cohort studies: Bias in estimates of socioeconomic inequalities', *Epidemiology*, vol. 24, no. 1, pp. 1-9.

Hox, JJ & Boeije, HR 2005, 'Data collection, primary versus secondary', *Encyclopedia of Social Measurement*, vol. 1, no. 1, pp. 593-599.

Hu, KC & Jen, W 2010, 'From the viewpoint of business customers to explore the antecedents of satisfaction and loyalty for freight shipping industry in Taiwan', *Journal of the Eastern Asia Society for Transportation Studies*, vol. 8, no. 2, pp. 721-734.

Huang, S-HS & Hsu, W-KK 2016, 'Evaluating the service requirements of combination air cargo carriers', *Asia Pacific Management Review*, vol. 21, no. 1, pp. 1-8.

Huang, ST, Bulut, E & Duru, O 2015, 'Service quality assessment in liner shipping industry: An empirical study on Asian shipping case', *International Journal of Shipping and Transport Logistics*, vol. 7, no. 2, pp. 221-242.

Hung, K & Law, R 2011, 'An overview of internet-based surveys in hospitality and tourism journals', *Tourism Management*, vol. 32, no. 4, pp. 717-724.

Hutt, M & Speh, T 2012, *Business marketing management: B2B*, Eleventh edn, Cengage Learning, United States of America.

Imai, A, Nishimura, E & Current, J 2007, 'A Lagrangian relaxation-based heuristic for the vehicle routing with full container load', *European Journal of Operational Research*, vol. 176, no. 1, pp. 87-105.

Imai, A, Nishimura, E & Papadimitriou, S 2003, 'Berth allocation with service priority', *Transportation Research Part B: Methodological*, vol. 37, no. 5, pp. 437-457.

Ireton, S 2007, 'Steps to successful supplier/buyer partnerships', *Logistics Today*, vol. 48, no. 9, pp. 44-46.

Jaržemskiene, I 2009, 'Research into the methods of analysing the productivity indicators of transport terminals', *Transport*, vol. 24, no. 3, pp. 192-199.

Jerman, RE, Anderson, RD & Constantin, JA 1978, 'Shipper versus carrier perceptions of carrier selection variables', *International Journal of Physical Distribution & Materials Management*, vol. 9, no. 1, pp. 29-38.

Jerrold, JV 2014, 'A qualitative study of international organizational buyer behavior', *Review of Business & Finance Studies*, vol. 5, no. 2, pp. 75-83.

Jia, P, Govindan, K & Kannan, D 2015, 'Identification and evaluation of influential criteria for the selection of an environmental shipping carrier using DEMATEL: A case from India', *International Journal of Shipping and Transport Logistics*, vol. 7, no. 6, pp. 719-741.

Johansson, HJ 1993, *Business process reengineering: Breakpoint strategies for market dominance*, John Wiley & Sons, Chichester, United Kingdom.

John, OP & Benet-Martínez, V 2012, *Measurement: Reliability, construct validation, and scale construction*, Cambridge University Press, United Kingdom.

Juga, J, Juntunen, J & Juntunen, M 2012, 'Impact of service quality, image and relational aspects on satisfaction and loyalty in logistics outsourcing relationships', *International Journal of Shipping and Transport Logistics*, vol. 4, no. 1, pp. 17-28.

Kannan, V 2010, 'Benchmarking the service quality of ocean container carriers using AHP', *Benchmarking: An International Journal*, vol. 17, no. 5, pp. 637-656.

Kannan, V, Bose, S & Kannan, N 2011, 'An evaluation of ocean container carrier selection criteria: An Indian shipper's perspective', *Management Research Review*, vol. 34, no. 7, pp. 754-772.

Kannan, V, Bose, S & Kannan, N 2012, 'Improving the service quality of ocean container carriers: An Indian case study', *Benchmarking: An International Journal*, vol. 19, no. 6, pp. 709-729.

Kaselimi, EN, Notteboom, TE & De Borger, B 2011, 'A game theoretical approach to competition between multi-user terminals: The impact of dedicated terminals', *Maritime Policy & Management*, vol. 38, no. 4, pp. 395-414.

Keller, G 2012, *Managerial statistics*, Eighth edn, South-Western Cengage Learning, United States.

Kent, JL & Parker, RS 1999, 'International containership carrier selection criteria: Shippers/carriers differences', *International Journal of Physical Distribution & Logistics Management*, vol. 29, no. 6, pp. 398-408.

Kilibarda, M, Nikolicic, S, Andrejic, M, Hazen, B & Lalwani, C 2016, 'Measurement of logistics service quality in freight forwarding companies: A case study of the Serbian market', *International Journal of Logistics Management*, vol. 27, no. 3, pp. 1-41.

Kim, HC 2014, 'Developing a mode choice model for New Zealand freight transportation', Doctorate thesis, University of Canterbury.

Kline, RB 2015, *Principles and practice of structural equation modeling*, Fourth edn, Guilford Publications, New York, USA.

Knowler, G 2014, 'Confusion in China', *Journal of Commerce*, vol. 15, no. 14, pp. 44-51.

Kokkinis, G, Mihiotis, A & Pappis, CP 2006, 'Freight forwarding in Greece: Services provided and choice criteria', *EuroMed Journal of Business*, vol. 1, no. 2, pp. 64-81.

Kou, Y & Luo, M 2016, 'Strategic capacity competition and overcapacity in shipping', *Maritime Policy & Management*, vol. 43, no. 4, pp. 389-406.

Krajewska, MA 2008, *Potentials for efficiency increase in modern freight forwarding*, 1st Edition edn, Springer, Germany.

Krajewska, MA & Kopfer, H 2006a, 'Collaborating freight forwarding enterprises', *OR Spectrum*, vol. 28, no. 3, pp. 301-317.

Krajewska, MA & Kopfer, H 2006b, 'Profit sharing approaches for freight forwarders: An overview', in D Ivanov, A Kuhn & Lukinskiy (eds), *The 5th international conference on modern trends in logistics*, Germany, pp. 157-161.

Krapfel, RE & Mentzer, JT 1982, 'Shippers' transportation choice processes under deregulation', *Industrial Marketing Management*, vol. 11, no. 2, pp. 117-124.

Kruger, D 2003, 'Integrating quantitative and qualitative methods in community research', *The Community Psychologist*, vol. 36, no. 2, pp. 18-19.

Kuster, J 2008, *Providing decision support in the operative management of process disruptions*, vol. 4, GITO mbH Verlag, Berlin.

Lai, K-H & Cheng, T 2004, 'A study of the freight forwarding industry in Hong Kong', *International Journal of Logistics Research and Applications*, vol. 7, no. 2, pp. 71-84.

Lai, K-H, Lun, VY, Wong, CW & Cheng, T 2011, 'Green shipping practices in the shipping industry: Conceptualization, adoption, and implications', *Resources, Conservation and Recycling*, vol. 55, no. 6, pp. 631-638.

Lai, K-H, Ngai, E & Cheng, T 2004, 'An empirical study of supply chain performance in transport logistics', *International Journal of Production Economics*, vol. 87, no. 3, pp. 321-331.

Lai, K & Shih, K 1992, 'A study of container berth allocation', *Journal of Advanced Transportation*, vol. 26, no. 1, pp. 45-60.

Lam, JSL & Dai, J 2012, 'A decision support system for port selection', *Transportation Planning and Technology*, vol. 35, no. 4, pp. 509-524.

Lam, JSL & van de Voorde, E 2011, 'Scenario analysis for supply chain integration in container shipping', *Maritime Policy & Management*, vol. 38, no. 7, pp. 705-725.

Lam, JSL & Zhang, L 2014, 'Enhanced logistics service provider framework for higher integration and efficiency in maritime logistics', *International Journal of Logistics Research and Applications*, vol. 17, no. 2, pp. 89-113.

Lambert, DM & Cooper, MC 2000, 'Issues in supply chain management', *Industrial Marketing Management*, vol. 29, no. 1, pp. 65-83.

Lambert, DM, Lewis, MC & Stock, JR 1993, 'Customer-focused strategies for motor carriers', *Transportation Journal*, vol. 32, no. 4, pp. 21-28.

Larson, PD & Gammelgaard, B 2001, 'Logistics in Denmark: A survey of the industry', *International Journal of Logistics*, vol. 4, no. 2, pp. 191-206.

Laursen, W 2014, *Ghana is rapidly growing into a maritime hub*, The Maritime Executive, viewed 22/11/2015, <<http://www.maritime-executive.com/features/Ghana-is-Rapidly-Growing-into-a-Maritime-Hub-2014-08-15>>.

Leachman, RC 2008, 'Port and modal allocation of waterborne containerized imports from Asia to the United States', *Transportation Research Part E: Logistics and Transportation Review*, vol. 44, no. 2, pp. 313-331.

Lebbadi, T 2015, 'Role of the institutional theory for implementation information technology to enhance safety management in shipping companies', in *Science and Information Conference (SAI)*, 2015, London, UK, pp. 1340-1351.

Lee, HL & Billington, C 1992, 'Managing supply chain inventory: Pitfalls and opportunities', *Sloan Management Review*, vol. 33, no. 3, pp. 65-73.

Lee, T-C, Chang, Y-T & Lee, PT 2013, 'Economy-wide impact analysis of a carbon tax on international container shipping', *Transportation Research Part A: Policy and Practice*, vol. 58, no. 1, pp. 87-102.

Legato, P & Mazza, RM 2001, 'Berth planning and resources optimisation at a container terminal via discrete event simulation', *European Journal of Operational Research*, vol. 133, no. 3, pp. 537-547.

Leonard, TJ, Gallo, P & Véronneau, S 2015, 'Security challenges in United States sea ports: An overview', vol. 8, no. 1, pp. 41-49.

Levin, Y, Nediak, M & Topaloglu, H 2012, 'Cargo capacity management with allotments and spot market demand', *Operations Research*, vol. 60, no. 2, pp. 351-365.

Li, L & Zhang, RQ 2015, 'Cooperation through capacity sharing between competing forwarders', *Transportation Research Part E: Logistics and Transportation Review*, vol. 75, no. 1, pp. 115-131.

Li, Z, Bookbinder, JH & Elhedhli, S 2012, 'Optimal shipment decisions for an airfreight forwarder: Formulation and solution methods', *Transportation Research Part C: Emerging Technologies*, vol. 21, no. 1, pp. 17-30.

Li, Z & Hensher, D 2012, 'Accommodating risk attitudes in freight transport behaviour research', *Transport Reviews*, vol. 32, no. 2, pp. 221-239.

Liang, N & Parkhe, A 1997, 'Importer behavior: The neglected counterpart of international exchange', *Journal of International Business Studies*, vol. 28, no. 3, pp. 495-530.

Liberatore, MJ & Miller, T 1995, 'A decision support approach for transport carrier and mode selection', *Journal of Business Logistics*, vol. 16, no. 2, pp. 85-115.

Lieb, R & Bentz, BA 2005, 'The use of third-party logistics services by large American manufacturers: The 2004 survey', *Transportation Journal*, vol. 44, no. 2, pp. 5-15.

Lieb, R & Miller, J 2002, 'The use of third-party logistics services by large US manufacturers, the 2000 survey', *International Journal of Logistics*, vol. 5, no. 1, pp. 1-12.

Lillie, M & Sparks, L 1993, 'The buying behaviour of air freight forwarders', *International Journal of Physical Distribution & Logistics Management*, vol. 23, no. 1, pp. 14-22.

Lin, Y-K & Yeh, C-T 2010, 'Optimal carrier selection based on network reliability criterion for stochastic logistics networks', *International Journal of Production Economics*, vol. 128, no. 2, pp. 510-517.

Lin, Y-K & Yeh, C-T 2013, 'Determine the optimal carrier selection for a logistics network based on multi-commodity reliability criterion', *International Journal of Systems Science*, vol. 44, no. 5, pp. 949-965.

Lirn, T-C & Wong, R-D 2013, 'Determinants of grain shippers' and importers' freight transport choice behaviour', *Production Planning & Control*, vol. 24, no. 7, pp. 575-588.

Longva, T, Eide, MS & Skjong, R 2010, 'Determining a required energy efficiency design index level for new ships based on a cost-effectiveness criterion', *Maritime Policy & Management*, vol. 37, no. 2, pp. 129-143.

Lorange, P 2016, 'The maritime transport of the future', in *International Association of Maritime Economists*, Hamburg.

Loxton, N 2015, *Applied structure equation modelling using AMOS*, Australian Consortuim for Social and Political Research Incorporated, Australia.

Lu, C-S 2000, 'Logistics services in Taiwanese maritime firms', *Transportation Research Part E: Logistics and Transportation Review*, vol. 36, no. 2, pp. 79-96.

Lu, C-S 2003a, 'An evaluation of service attributes in a partnering relationship between maritime firms and shippers in Taiwan', *Transportation Journal*, vol. 42, no. 5, pp. 5-16.

Lu, C-S 2003b, 'The impact of carrier service attributes on shipper-carrier partnering relationships: A shipper's perspective', *Transportation Research Part E: Logistics and Transportation Review*, vol. 39, no. 5, pp. 399-415.

Lu, C-S 2003c, 'Market segment evaluation and international distribution centers', *Transportation Research Part E: Logistics and Transportation Review*, vol. 39, no. 1, pp. 49-60.

Lu, C-S 2007, 'Evaluating key resources and capabilities for liner shipping services', *Transport Reviews*, vol. 27, no. 3, pp. 285-310.

Lun, YV & Browne, M 2009, 'Fleet mix in container shipping operations', *International Journal of Shipping and Transport Logistics*, vol. 1, no. 2, pp. 103-118.

Lun, YV, Lai, K-h & Cheng, TE 2013, 'An evaluation of green shipping networks to minimize external cost in the Pearl River Delta region', *Technological Forecasting and Social Change*, vol. 80, no. 2, pp. 320-328.

MacGillavry, K & Wilson, A 2014, 'Delivering loyalty via customer experience management at DHL freight', *Global Business and Organizational Excellence*, vol. 33, no. 6, pp. 6-20.

Maheshika, M & Abeysekara, B 2015, 'Evaluation of main factors affecting the choice of a freight forwarder: A Sri Lankan exporter's perspective', in *Moratuwa Engineering Research Conference (MERCon)*, Moratuwa, pp. 199-204.

Malaval, P, Bénaroya, C & Aflalo, J 2014, 'The individual and organizational purchase', in *Aerospace Marketing Management*, Springer Switzerland, pp. 29-82.

Maloni, M, Gligor, DM & Lagoudis, IN 2016, 'Linking ocean container carrier capabilities to shipper-carrier relationships: a case study', *Maritime Policy & Management*, vol. 1, no. 1, pp. 1-17.

Maloni, M, Paul, JA & Gligor, DM 2013, 'Slow steaming impacts on ocean carriers and shippers', *Maritime Economics & Logistics*, vol. 15, no. 2, pp. 151-171.

Mander, S 2016, 'Slow steaming and a new dawn for wind propulsion: A multi-level analysis of two low carbon shipping transitions', *Marine Policy*, Vol. 1, no. 0, pp. 1-7.

Mangan, J, Lalwani, C & Gardner, B 2002, 'Modelling port/ferry choice in RoRo freight transportation', *International Journal of Transport Management*, vol. 1, no. 1, pp. 15-28.

Markus, KA 2012, 'Principles and practice of structural equation modeling by Rex B. Kline', *Structural Equation Modeling: A Multidisciplinary Journal*, vol. 19, no. 3, pp. 509-512.

Marsh, HW, Balla, JR & McDonald, RP 1988, 'Goodness-of-fit indexes in confirmatory factor analysis: The effect of sample size', *Psychological Bulletin*, vol. 103, no. 3, pp. 391-410.

Mason, J 2002, *Qualitative researching*, Second edn, Sage, London.

Matear, S & Gray, R 1993, 'Factors influencing freight service choice for shippers and freight suppliers', *International Journal of Physical Distribution & Logistics Management*, vol. 23, no. 2, pp. 25-35.

McGinnis, MA 1978, 'Segmenting freight markets', *Transportation Journal*, vol. 18, no. 1, pp. 58-68.

McGinnis, MA 1979, 'Shipper attitudes toward freight transportation choice: A factor analytic study', *International Journal of Physical Distribution & Logistics Management*, vol. 10, no. 1, pp. 25-34.

McGinnis, MA 1989, 'A comparative evaluation of freight transportation choice models', *Transportation Journal*, vol. 29, no. 2, pp. 36-46.

McGinnis, MA 1990, 'The relative importance of cost and service in freight transportation choice: Before and after deregulation', *Transportation Journal*, vol. 30, no. 1, pp. 12-19.

McMullen, BS 2000, 'The US motor carrier industry at the millennium', *Journal of the Transportation Research Forum*, vol. 54, no. 4, pp. 141-150.

McNabb, DE 2015, *Research methods for political science: Quantitative and qualitative methods*, Second edn, Routledge, New York.

Meeker, WQ & Escobar, LA 2014, 'Statistical methods for reliability data', in John Wiley & Sons, United States.

Meixell, MJ & Norbis, M 2008, 'A review of the transportation mode choice and carrier selection literature', *International Journal of Logistics Management*, The, vol. 19, no. 2, pp. 183-211.

Meixell, MJ & Norbis, M 2012, 'Integrating carrier selection with supplier selection decisions to improve supply chain security', *International Transactions in Operational Research*, vol. 19, no. 5, pp. 711-732.

Meng, Q, Wang, S, Andersson, H & Thun, K 2013, 'Containership routing and scheduling in liner shipping: overview and future research directions', *Transportation Science*, vol. 48, no. 2, pp. 265-280.

MergeGlobal Value Creation Initiative 2008, 'Forwarder Momentum', *American Shipper*, vol. 50, no. 3, pp. 36-53.

Merk, O, Busquet, B & Aronietis, R 2015, *The Impact of Mega-Ships*, International transport forum, viewed 22/10/2015 2015, <http://www.internationaltransportforum.org/pub/pdf/15CSPA_Mega-Ships.pdf>.

Midoro, R, Musso, E & Parola*, F 2005, 'Maritime liner shipping and the stevedoring industry: Market structure and competition strategies', *Maritime Policy & Management*, vol. 32, no. 2, pp. 89-106.

Minckler, CH 2011, 'Teacher social capital: The development of a conceptual model and measurement framework with application to educational leadership and teacher efficacy', Doctorate thesis, University of Louisiana at Lafayette.

Miyashita, K 2015, 'Japanese forwarders' local import hub in Asia: 3PL power and environmental improvement', *The Asian Journal of Shipping and Logistics*, vol. 31, no. 3, pp. 405-427.

Mohammaditabar, D & Teimoury, E 2008, 'Integrated freight transportation carrier selection and network flow assignment: methodology and case study', *Journal of Applied Sciences*, vol. 8, no. 17, pp. 2928-2938.

Monczka, R, Handfield, R, Giunipero, L & Patterson, J 2008, *Purchasing and supply chain management*, Cengage Learning, USA.

Morimoto, N 2006, *System and method for tracking and routing shipped items*, Google Patents, viewed 02/15/2015.

Muijs, D 2010, *Doing quantitative research in education with SPSS*, Sage, viewed 12/08/2014,

<<http://books.google.com.au/books?hl=en&lr=&id=apFMQHF768EC&oi=fnd&pg=PR5&dq=Doing+quantitative+research+in+education+with+SPSS&ots=Wujnx4j333&sig=PQKvAYDT1BvXBGxQpSd69akMHFU#v=onepage&q=Doing%20quantitative%20research%20in%20education%20with%20SPSS&f=false>>.

Murphy, PR & Daley, JM 1995, 'International freight forwarders: Current activities and operational issues', *International Journal of Purchasing and Materials Management*, vol. 31, no. 2, pp. 21-27.

Murphy, PR & Daley, JM 2000, 'An empirical study of Internet issues among international freight forwarders', *Transportation Journal*, vol. 39, no. 4, pp. 5-13.

Murphy, PR & Daley, JM 2001, 'Profiling international freight forwarders: An update', *International Journal of Physical Distribution & Logistics Management*, vol. 31, no. 3, pp. 152-168.

Murphy, PR, Daley, JM & Dalenberg, DR 1992, 'Profiling international freight forwarders: A benchmark', *International Journal of Physical Distribution & Logistics Management*, vol. 22, no. 1, pp. 35-41.

Muthuvelatutham, C & Karuppasamy, R 2013, 'Customs documentation for exim trade', *International Journal of Management Research and Development*, vol. 3, no. 1, pp. 22-34.

Nam, H-S & Song, D-W 2011, 'Defining maritime logistics hub and its implication for container port', *Maritime Policy & Management*, vol. 38, no. 3, pp. 269-292.

Nelson, P 1970, 'Information and consumer behavior', *The Journal of Political Economy*, vol. 78, no. 2, pp. 311-329.

Ng, A & Yu, K 2006, 'Assessing the attractiveness of ports in the North European container transshipment market: An agenda for future research in port competition', *Maritime Economics & Logistics*, vol. 8, no. 3, pp. 234-250.

Ng, B, Ferrin, BG & Pearson, JN 1997, 'The role of purchasing/transportation in cycle time reduction', *International Journal of Operations & Production Management*, vol. 17, no. 6, pp. 574-591.

Nielsen, JS 2011, 'Use of the internet for willingness-to-pay surveys: A comparison of face-to-face and web-based interviews', *Resource and Energy Economics*, vol. 33, no. 1, pp. 119-129.

Nir, A-S, Lin, K & Liang, G-S 2003, 'Port choice behaviour from the perspective of the shipper', *Maritime Policy & Management*, vol. 30, no. 2, pp. 165-173.

Nordas, H, Pinali, E & Grosso, MG 2006, *Logistics and time as a trade barrier*, Organisation for Economic Co-operation and Development (OECD) Trade Policy Working Paper, France.

Notteboom, TE 2006, 'The time factor in liner shipping services', *Maritime Economics & Logistics*, vol. 8, no. 1, pp. 19-39.

Notteboom, TE 2007, 'The changing face of the terminal operator business: Lessons for the regulator', paper presented to ACCC Regulatory Conference Gold Coast, Australia. Available at: <http://www.accc.gov.au/content/item.phtml>, 26-27 July 2007.

Notteboom, TE & Merckx, F 2006, 'Freight integration in liner shipping: A strategy serving global production networks', *Growth and Change*, vol. 37, no. 4, pp. 550-569.

Notteboom, TE & Rodrigue, J-P 2008, 'Containerisation, box logistics and global supply chains: The integration of ports and liner shipping networks', *Maritime Economics & Logistics*, vol. 10, no. 1, pp. 152-174.

Notteboom, TE & Rodrigue, J-P 2009, 'The future of containerization: Perspectives from maritime and inland freight distribution', *Geojournal*, vol. 74, no. 1, pp. 7-22.

Notteboom, TE & Vernimmen, B 2009, 'The effect of high fuel costs on liner service configuration in container shipping', *Journal of Transport Geography*, vol. 17, no. 5, pp. 325-337.

O'Rourke, N, Psych, R & Hatcher, L 2013, *A step-by-step approach to using SAS for factor analysis and structural equation modeling*, Sas Institute, United States of America.

Olsson, J & Woxenius, J 2012, 'Location of freight consolidation centres serving the city and its surroundings', *Procedia-Social and Behavioral Sciences*, vol. 39, no. 1, pp. 293-306.

Onwuegbuzie, AJ & Teddlie, C 2003, 'A framework for analyzing data in mixed methods research', in *Handbook of mixed methods in social and behavioral research*, SAGE Publications Thousand Oaks, California pp. 351-383.

Oosterhuis, M, Molleman, E & van der Vaart, T 2013, 'Differences in buyers' and suppliers' perceptions of supply chain attributes', *International Journal of Production Economics*, vol. 142, no. 1, pp. 158-171.

Opperman, AE, Benson, EL & Milhausen, RR 2013, 'Confirmatory factor analysis of the female sexual function index', *The Journal of Sex Research*, vol. 50, no. 1, pp. 29-36.

Pallant, J 2011, *SPSS survival manual: A step by step guide to data analysis using SPSS*, 4th edn, Allen and Unwin, New South Wales, Australia.

Pallant, J 2013, *SPSS survival manual*, 5 edn, McGraw-Hill International, Berkshire, England UK.

Panayides, PM 2006, 'Maritime logistics and global supply chains: Towards a research agenda', *Maritime Economics & Logistics*, vol. 8, no. 1, pp. 3-18.

Panayides, PM & Cullinane, K 2002, 'Competitive advantage in liner shipping: A review and research agenda', *International Journal of Maritime Economics*, vol. 4, no. 3, pp. 189-209.

Panayides, PM & Song, D-W 2013, 'Maritime logistics as an emerging discipline', *Maritime Policy & Management*, vol. 40, no. 3, pp. 295-308.

Panayides, PM, Wiedmer, R, Andreou, PC & Louca, C 2012, 'Supply chain integration of shipping companies', in *Maritime logistics: A complete guide to effective shipping and port management*, Kogan Page Limited, Great Britain, pp. 101-122.

Pantouvakis, AM 2007, 'Who pays the ferryman? An analysis of the ferry passenger's selection dilemma', *Maritime Policy & Management*, vol. 34, no. 6, pp. 591-612.

Papa, P 2013, 'US and EU strategies for maritime transport security: A comparative perspective', *Transport Policy*, vol. 28, no. 1, pp. 75-85.

Park, B-I & Min, H 2011, 'The selection of transshipment ports using a hybrid data envelopment analysis/analytic hierarchy process', *Journal of Transportation Management*, vol. 22, no. 1, pp. 47-64.

Park, JJ & Koo, WW 2010, 'An econometric analysis of ocean freight rates for grain shipments from the United States to major importing countries', in *Journal of the Transportation Research Forum*, vol. 43, pp. 85-100.

Park, Y, Choi, JK & Zhang, A 2009, 'Evaluating competitiveness of air cargo express services', *Transportation Research Part E: Logistics and Transportation Review*, vol. 45, no. 2, pp. 321-334.

Parola, F & Musso, E 2007, 'Market structures and competitive strategies: The carrier-stevedore arm-wrestling in northern European ports', *Maritime Policy & Management*, vol. 34, no. 3, pp. 259-278.

Pato, M 2010, 'Ship assignment with hub and spoke constraints', *Maritime Policy & Management*, vol. 29, no. 2, pp. 135-150.

Pawlik, T, Gaffron, P & Drewes, PA 2012, 'Corporate social responsibility in maritime logistics', in D-W Song & PM Panayides (eds), *Maritime Logistics: Contemporary Issues*, First edn, Emerald, UK, pp. 205-226.

Pedersen, EL & Gray, R 1998, 'The transport selection criteria of Norwegian exporters', *International Journal of Physical Distribution & Logistics Management*, vol. 28, no. 2, pp. 108-120.

Persson, G & Virum, H 2001, 'Growth strategies for logistics service providers: A case study', *International Journal of Logistics Management*, The, vol. 12, no. 1, pp. 53-64.

Peters, HJ 2001, 'Developments in global seatriade and container shipping markets: Their effects on the port industry and private sector involvement', *International Journal of Maritime Economics*, vol. 3, no. 1, pp. 3-26.

Peterson, J & Treat, A 2008, *The post-9/11 global framework for cargo security*, United States International Trade Commission, viewed 10/12/2014 2014, <http://www.usitc.gov/journals/journal_archive.htm#2008>.

Plomaritou, V, Plomaritou, E & Giziakis, K 2011, 'Shipping marketing & customer orientation: The psychology & buying behavior of charterer & shipper in the tramp & liner market', *Management-Journal of Contemporary Management Issues*, vol. 16, no. 1, pp. 57-89.

Pope, DJ & Thomchick, EA 1985, 'US foreign freight forwarders and NVOCCs', *Transportation Journal*, vol. 24, no. No. 3, pp. 26-36.

Premeaux, SR 2002, 'Motor carrier selection criteria: Perceptual differences between shippers and motor carriers', *Transportation Journal*, vol. 42, no. 2, pp. 28-38.

Premeaux, SR 2010, 'Motor carriers' and shippers' perception of the carrier choice decision', *Journal of the Transportation Research Forum*, vol. 46, no. 3, pp. 5-12.

Premeaux, SR 2011, 'The similarity of motor carriers' and shippers' perceptions of the carrier choice decision improve', *Journal of the Transportation Research Forum*, vol. 48, no. 1, pp. 39-47.

Psaraftis, HN & Kontovas, CA 2010, 'Balancing the economic and environmental performance of maritime transportation', *Transportation Research Part D: Transport and Environment*, vol. 15, no. 8, pp. 458-462.

Punch, KF 2013, *Introduction to social research: Quantitative and qualitative approaches*, Third edn, Sage Publication (CA), London.

Qureshi, M, Kumar, D & Kumar, P 2007, 'Modeling the logistics outsourcing relationship variables to enhance shippers' productivity and competitiveness in logistical supply chain', *International Journal of Productivity and Performance Management*, vol. 56, no. 8, pp. 689-714.

Qureshi, M, Kumar, D & Kumar, P 2008, 'An integrated model to identify and classify the key criteria and their role in the assessment of 3PL services providers', *Asia Pacific Journal of Marketing and Logistics*, vol. 20, no. 2, pp. 227-249.

Raa, B, Dullaert, W & Van Schaeren, R 2011, 'An enriched model for the integrated berth allocation and quay crane assignment problem', *Expert Systems with Applications*, vol. 38, no. 11, pp. 14136-14147.

Rajesh, R, Pugazhendhi, S, Ganesh, K, Yves, D, Lenny Koh, S & Muralidharan, C 2011, 'Perceptions of service providers and customers of key success factors of third-party logistics relationships—an empirical study', *International Journal of Logistics Research and Applications*, vol. 14, no. 4, pp. 221-250.

Ramberg, J 1998, 'Unification of the law of international freight forwarding', *Uniform Law Review*, vol. 3, no. 1, pp. 5-14.

Randers, J & Göluke, U 2007, 'Forecasting turning points in shipping freight rates: Lessons from 30 years of practical effort', *System Dynamics Review*, vol. 23, no. 2-3, pp. 253-284.

Rao, K & Young, RR 1994, 'Global supply chains: Factors influencing outsourcing of logistics functions', *International Journal of Physical Distribution & Logistics Management*, vol. 24, no. 6, pp. 11-19.

Razzaque, MA & Sheng, CC 1998, 'Outsourcing of logistics functions: A literature survey', *International Journal of Physical Distribution & Logistics Management*, vol. 28, no. 2, pp. 89-107.

Rea, LM & Parker, RA 2012, *Designing and conducting survey research: A comprehensive guide*, Third edn, John Wiley & Sons, USA.

Reid, S & Burlingame, L 2015, 'Documentation and logistics issues in exporting firms', in *Proceedings of the 1982 Academy of Marketing Science (AMS) Annual Conference*, pp. 221-225.

Reis, V 2014, 'Analysis of mode choice variables in short-distance intermodal freight transport using an agent-based model', *Transportation Research Part A: Policy and Practice*, vol. 61, no. 1, pp. 100-120.

Riessen, BV, Negenborn, RR, Dekker, R & Lodewijks, G 2015, 'Service network design for an intermodal container network with flexible transit times and the possibility of using subcontracted transport', *International Journal of Shipping and Transport Logistics*, vol. 7, no. 4, pp. 457-478.

Riff, D, Lacy, S & Fico, F 2014, *Analyzing media messages: Using quantitative content analysis in research*, Third edn, Routledge, USA.

Ritchie, J, Lewis, J, Nicholls, CM & Ormston, R 2013, *Qualitative research practice: A guide for social science students and researchers*, Sage, London.

Roberts, P, Priest, H & Traynor, M 2006, 'Reliability and validity in research', *Nursing standard*, vol. 20, no. 44, pp. 41-45.

Robinson, PJ, Faris, CW & Wind, Y 1967, 'Industrial buying and creative marketing', in PJ Robinson, CW Faris & Y Wind (eds), Allyn & Bacon, Boston, USA.

Rodrigue, JP 2012, 'The geography of global supply chains: Evidence from third-party logistics', *Journal of Supply Chain Management*, vol. 48, no. 3, pp. 15-23.

Rodrigue, JP, Zumerchik, J & Ogard, EL 2013, 'The US transition to a motor carrier supplied marine chassis: Operational impacts on and off terminal', in J-P Rodrigue, J Zumerchik & EL Ogard (eds), *Transportation Research Board 92nd Annual Meeting*, US.

Rogerson, S 2013, 'Purchasing process for freight transport services and influence on CO₂ emissions', Chalmers University of Technology, <<http://publications.lib.chalmers.se/publication/172096-purchasing-process-for-freight-transport-services-and-influence-on-co2-emissions>>.

Rourke, L & Anderson, T 2004, 'Validity in quantitative content analysis', *Educational Technology Research and Development*, vol. 52, no. 1, pp. 5-18.

Royal, A, Baker, J & Ponton, M 2013, *Social science research design and statistics*, Chesapeake, VA: Watertree Press LLC.

Rubin, A & Babbie, E 2013, *Brooks/cole empowerment series: Research methods for social work*, Eighth edn, Cengage Learning, United States of America.

Rudjanakanoknad, J, Suksirivoraboot, W & Sukdanont, S 2014, 'Evaluation of international ports in Thailand through trade facilitation indices from freight forwarders', *Procedia-Social and Behavioral Sciences*, vol. 111, no. 1, pp. 1073-1082.

Saeed, N 2009, 'An analysis of carriers' selection criteria when choosing container terminals in Pakistan', *Maritime Economics & Logistics*, vol. 11, no. 3, pp. 270-288.

Saeed, N 2012, 'A game theoretical analysis of vertical and horizontal co-operation among freight forwarders', *Association for European Transport and Contributors*, vol. 1, no. 1, pp. 1-13.

Saeed, N 2013, 'Cooperation among freight forwarders: Mode choice and intermodal freight transport', *Research in Transportation Economics*, vol. 42, no. 1, pp. 77-86.

Saeed, N & Aaby, BC 2013, 'Analysis of factors contributing to criteria for selection of European container terminals', *Transportation Research Record: Journal of the Transportation Research Board*, vol. 8, no. 1, pp. 31-38.

Sahay, B & Mohan, R 2006, 'Managing 3PL relationships', *International Journal of Integrated Supply Management*, vol. 2, no. 1, pp. 69-90.

Saini, K & Vaishya, R 2016, 'Consolidation of load in supply chain management', *International Journal of Scientific Research in Science*, vol. 2, no. 3, pp. 784-788.

Şakar, GD 2012, 'An analysis of freight forwarders' perceptions about multimodal transport', vol. 4, no. 1, pp. 1-22.

Saldanha, JP, Tyworth, JE, Swan, PF & Russell, DM 2009, 'Cutting logistics costs with ocean carrier selection', *Journal of Business Logistics*, vol. 30, no. 2, pp. 175-195.

Saleh, AM 2006, 'Antecedents of commitment to an import supplier', PhD thesis, Queensland University of Technology.

Salleh, N, Riahi, R, Yang, Z & Wang, J 2014, 'A proposed Fuzzy Bayesian belief network model for evaluating the knowledge management capability of a liner shipping operator', in *International Conference on Enterprise Systems, Accounting and Logistics (11th ICESAL)*, Greece.

Samitas, AG & Kenourgios, DF 2007, 'Impact of mergers and acquisitions on stock returns of tramp shipping firms', *International Journal of Financial Services Management*, vol. 2, no. 4, pp. 327-343.

Sardana, G, Thatchenkery, T, Vijayvargiya, A & Dey, A 2010, 'An analytical approach for selection of a logistics provider', *Management Decision*, vol. 48, no. 3, pp. 403-418.

Saunders, M, Lewis, P & Thornhill, A 2011, *Research methods for business students*, Fifth edn, Pearson Education Limited, London.

Sawhney, R & Sumukadas, N 2005, 'Coping with customs clearance uncertainties in global sourcing', *International Journal of Physical Distribution & Logistics Management*, vol. 35, no. 4, pp. 278-295.

Scandura, TA & Williams, EA 2000, 'Research methodology in management: Current practices, trends, and implications for future research', *Academy of Management Journal*, vol. 43, no. 6, pp. 1248-1264.

Schönberger, J & Kopfer, H 2011, 'Approaching the application borders of network capacity control in road haulage', in *Autonomous Cooperation and Control in Logistics*, Springer, Germany, pp. 45-59.

Schramm, H-J 2003, *The role of freight forwarders in international logistic chains*, Dresden University of Technology, Faculty of Transportation Science "Friedrich List" Institute of Economics and Traffic, Germany.

Schramm, H-J 2012, *Freight forwarder's intermediary role in multimodal transport chains: A social network approach*, Springer, London.

Selviaridis, K & Spring, M 2007, 'Third party logistics: A literature review and research agenda', *International Journal of Logistics Management*, The, vol. 18, no. 1, pp. 125-150.

Semeijn, J & Vellenga, DB 1995, 'International logistics and one-stop shopping', *International Journal of Physical Distribution & Logistics Management*, vol. 25, no. 10, pp. 26-44.

Setamanit, S-o & Pipatwattana, A 2015, 'Criteria for ocean freight carrier selection: A perspective of Japanese automotive company in Thailand', *ASBBS E-Journal*, vol. 11, no. 1, pp. 89-96.

Shang, K-C & Lu, C-S 2012, 'Customer relationship management and firm performance: An empirical study of freight forwarder services', *Journal of Marine Science and Technology*, vol. 20, no. 1, pp. 64-72.

Shek, TLD & Yu, L 2014, 'Confirmatory factor analysis using AMOS: A demonstration', *International Journal on Disability and Human Development*, vol. 13, no. 2, pp. 191-204.

Shin, SM 2015, 'Factors influencing trust and partnership in shipper-carrier relationship: How do these affect electronic trading transactions in South Korea?', *African Journal of Business Management*, vol. 9, no. 21, pp. 741-751.

Shipowners and Agents Association of Ghana 2016, *Membership list*, Shipowners and Agents Association of Ghana, viewed 31/03/2016, <<http://soaag.org/>>.

Singer, M & Donoso, P 2011, 'Contracting contractors', *Journal of Business Research*, vol. 64, no. 3, pp. 338-343.

Skovgaard, J 2012, 'Corporate social responsibility in the Danish shipping industry', in *DRUID Academy Conference*, Copenhagen.

Song, D-P & Xu, J 2012, 'CO2 emission comparison between direct and feeder liner services: A case study of Asia–Europe services interfacing with the UK', *International Journal of Sustainable Transportation*, vol. 6, no. 4, pp. 214-237.

Soppé, M, Parola, F & Frémont, A 2009, 'Emerging inter-industry partnerships between shipping lines and stevedores: From rivalry to cooperation?', *Journal of Transport Geography*, vol. 17, no. 1, pp. 10-20.

Soroya, GR & Ortiz, A 2012, 'Collaborative relationship model 3PL and SME collaborative', in *International Conference on Industrial Engineering and Industrial Management*, pp. 226-233.

Stephenson, FJ & Vann, JW 1981, 'Air cargo liability deregulation: Shippers' perspective', *Transportation Journal*, vol. 20, no. 3, pp. 48-58.

Suhr, DD 2006, 'Exploratory or confirmatory factor analysis?', in *SAS Users Group Internatonal Conference*, San Francisco, pp. 1-17.

Swan, PF & Tyworth, JE 2001, 'Shipper sensitivity to unreliable service in carload markets', *Transportation Journal*, vol. 40, no. 3, pp. 16-25.

Świtała, M & Kłosa, E 2015, 'The determinants of logistics cooperation in the supply chain-selected results of the opinion poll within logistics service providers and their customers', *LogForum*, vol. 11, no. 4, pp. 329-340.

Szyliowicz, JS & Zamparini, L 2014, 'Maritime security: Issues and challenges', in K Bichou, JS Szyliowicz & L Zamparini (eds), *Maritime Transport Security: Issues, Challenges and National Policies*, Edward Elgar Publishing Limited, UK.

Tabachnick, BG & Fidell, LS 2001, *Using multivariate statistics*, Fifth edn, Pearson Education, Boston.

Tashakkori, A & Teddlie, C 2010, *Sage handbook of mixed methods in social & behavioral research*, Second edn, Sage, USA.

Taudal Poulsen, R 2007, 'Liner shipping and technological innovation: Ostasiat and the container revolution, 1963–75', *Scandinavian Economic History Review*, vol. 55, no. 2, pp. 83-100.

Tax, SS, Brown, SW & Chandrashekar, M 1998, 'Customer evaluations of service complaint experiences: Implications for relationship marketing', *The Journal of Marketing*, vol. 62, no. 2, pp. 60-76.

Teddlie, C & Tashakkori, A 2009, *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*, Sage Publications Inc, United States.

Terpstra, V, Foley, J & Sarathy, R 2012, *International marketing*, Tenth edn, Naper Press, USA.

The Observatory of Economic Complexity, 2017, *Ghana trade balance*, viewed 10/05/2017, <http://atlas.media.mit.edu/en/profile/country/gha>.

Theofanis, S, Boile, M & Golias, M 2009, 'Container terminal berth planning: Critical review of research approaches and practical challenges', *Transportation Research Record: Journal of the Transportation Research Board*, vol. 21, no. 1, pp. 22-28.

Thomas, RM 2003, *Blending qualitative and quantitative research methods in theses and dissertations*, 3rd edn, Corwin Press, Thousand Oaks, California.

Tiwari, P, Itoh, H & Doi, M 2003, 'Shippers' port and carrier selection behaviour in China: A discrete choice analysis', *Maritime Economics & Logistics*, vol. 5, no. 1, pp. 23-39.

Tongzon, JL 2009, 'Port choice and freight forwarders', *Transportation Research Part E: Logistics and Transportation Review*, vol. 45, no. 1, pp. 186-195.

Treiman, DJ 2014, *Quantitative data analysis: Doing social research to test ideas*, First edn, John Wiley & Sons, United States of America.

Tseng, W-J, Ding, J-F & Li, M-H 2013, 'Risk management of cargo damage in export operations of ocean freight forwarders in Taiwan', *Journal of Engineering for the Maritime Environment*, vol. 1, no. 1, pp. 1-16.

Tuna, O 2001, 'Dimensions of service quality in container transportation: An empirical investigation', in MC Barla, OK Sag, M Roe & R Gray (eds), *Developments in Maritime Transport and Logistics in Turkey*, Ashgate Publishing Limited, England.

Tuna, O & Akarsu, M 1999, 'Freight transport service buying process: A general model for exporters', paper presented to strategic Approaches for Maritime Industries in Poland and Turkey, viewed 22/10/2014.

Tuna, O & Silan, M 2002, 'Freight transportation selection criteria: An empirical investigation of Turkish liner shipping', in *IAME International Conference, Panama*, Panama, pp. 13-15.

Tushevska, B 2014, 'Civil law versus common law concept of freight forwarders', *Balkan Social Science Review*, vol. 1, no. 4, pp. 45-67.

Tyworth, JE & Zeng, AZ 1998, 'Estimating the effects of carrier transit-time performance on logistics cost and service', *Transportation Research Part A: Policy and Practice*, vol. 32, no. 2, pp. 89-97.

Ülkü, MA & Bookbinder, JH 2012, 'Optimal quoting of delivery time by a third party logistics provider: The impact of shipment consolidation and temporal pricing schemes', *European Journal of Operational Research*, vol. 221, no. 1, pp. 110-117.

Ullman, GH 1970, 'Role of the American ocean freight forwarder in intermodal, containerized transportation', *Journal of Maritime Law and Commerce*, vol. 2, no. 3, pp. 625-644.

United Nations Conference on Trade and Development 2009, *Review of maritime transport*, United Nations, viewed 09 December, 2014 2014, <http://unctad.org/en/docs/rmt2009_en.pdf>.

United Nations Conference on Trade and Development 2015, *Review of maritime transport*, United Nations, viewed 20/02/2016 2016, <http://unctad.org/en/PublicationsLibrary/rmt2015_en.pdf>.

Van den Berg, R & De Langen, PW 2014a, 'Assessing the intermodal value proposition of shipping lines: Attitudes of shippers and forwarders', *Maritime Economics & Logistics*, vol. 17, no. 1, pp. 1-20.

Van den Berg, R & De Langen, PW 2014b, 'Towards an 'inland terminal centred' value proposition', in T Francis (ed.), *Maritime Policy & Management*, Routledge, The Netherlands, pp. 1-17.

Van den Berg, R & De Langen, PW 2015, 'Assessing the intermodal value proposition of shipping lines: Attitudes of shippers and forwarders', *Maritime Economics & Logistics*, vol. 17, no. 1, pp. 32-51.

Van den Berg, R & Langen, P 2011, 'Towards an 'ILT'centred value proposition in container transport', in *European Conference on Shipping, Intermodalism & Ports-ECONSHIP 2011: Maritime Transport: Opportunities & Threats in the Post-crises world*, Greece.

Van Der Horst, MR & De Langen, PW 2008, 'Coordination in hinterland transport chains: A major challenge for the seaport community', *Maritime Economics & Logistics*, vol. 10, no. 1, pp. 108-129.

Van der Vaart, T & Van Donk, DP 2006, 'Buyer-focused operations as a supply chain strategy: Identifying the influence of business characteristics', *International Journal of Operations & Production Management*, vol. 26, no. 1, pp. 8-23.

Van Winter, JA 2007, 'The impact of selected cultural dimensions on international services vendor selection criteria: An exploratory investigation', PhD thesis, George Washington University.

Vermeiren, T & Macharis, C 2016, 'Intermodal land transportation systems and port choice, an analysis of stated choices among shippers in the Rhine–Scheldt delta', *Maritime Policy & Management*, vol. 1, no. 1, pp. 1-13.

Vernimmen, B, Dullaert, W & Engelen, S 2007, 'Schedule unreliability in liner shipping: origins and consequences for the hinterland supply chain', *Maritime Economics & Logistics*, vol. 9, no. 3, pp. 193-213.

Vidal, CJ & Goetschalckx, M 2000, 'Modeling the effect of uncertainties on global logistics systems', *Journal of Business Logistics*, vol. 21, no. 1, pp. 95-120.

Voss, MD, Page Jr, TJ, Keller, SB & Ozment, J 2006, 'Determining important carrier attributes: A fresh perspective using the theory of reasoned action', *Transportation Journal*, vol. 45, no. 3, pp. 7-19.

Wagener, N 2014, 'Intermodal transport in europe-opportunities through innovation', *LogForum*, vol. 10, no. 4, pp. 371-382.

Wang, S & Meng, Q 2012a, 'Liner ship fleet deployment with container transshipment operations', *Transportation Research Part E: Logistics and Transportation Review*, vol. 48, no. 2, pp. 470-484.

Wang, S & Meng, Q 2012b, 'Liner ship route schedule design with sea contingency time and port time uncertainty', *Transportation Research Part B: Methodological*, vol. 46, no. 5, pp. 615-633.

Wang, X & Kopfer, H 2014, 'Collaborative transportation planning of less-than-truckload freight', *OR Spectrum*, vol. 36, no. 2, pp. 357-380.

Wanke, P, Correa, H, Jacob, J & Santos, T 2015, 'Including carbon emissions in the planning of logistic networks: A Brazilian case', *International Journal of Shipping and Transport Logistics*, vol. 7, no. 6, pp. 655-675.

Wen, C-H & Huang, J-Y 2007, 'A discrete choice model of ocean carrier choice', *Journal of the Eastern Asia Society for Transportation Studies*, vol. 7, no. 1, pp. 795-807.

Wen, C-H & Lin, W-W 2010, 'Market segmentation and positioning for ocean carriers: The Taiwan-South China route', in *General Proceedings of the 12th World Conference on Transport Research*, Lisbon, Portugal, pp. 11-15.

Wen, C-H & Lin, W-W 2015, 'Customer segmentation of freight forwarders and impacts on the competitive positioning of ocean carriers in the Taiwan-southern China trade lane', *Maritime Policy & Management*, vol. 43, no. 4, pp. 420-435.

Wiesmann, A 2010, 'Slow steaming a viable long-term option?', *Wartsila Technical Journal*, vol. 2, no. 1, pp. 49-55.

Wilding, R & Juriado, R 2004, 'Customer perceptions on logistics outsourcing in the European consumer goods industry', *International Journal of Physical Distribution & Logistics Management*, vol. 34, no. 8, pp. 628-644.

Williams, B, Brown, T & Onsman, A 2013, 'Exploratory factor analysis: A five-step guide for novices', *Australasian Journal of Paramedicine*, vol. 8, no. 3, pp. 1-13.

Wong, CY & Boon-itt, S 2008, 'The influence of institutional norms and environmental uncertainty on supply chain integration in the Thai automotive industry', *International Journal of Production Economics*, vol. 115, no. 2, pp. 400-410.

Wong, PC, Yan, H & Bamford, C 2008, 'Evaluation of factors for carrier selection in the China Pearl River delta', *Maritime Policy & Management*, vol. 35, no. 1, pp. 27-52.

Woo, J-K & Moon, DS-H 2014, 'The effects of slow steaming on the environmental performance in liner shipping', *Maritime Policy & Management*, vol. 41, no. 2, pp. 176-191.

Woolford, R & McKinnon, A 2011, 'The role of the shipper in decarbonising maritime supply chains', in T Notteboom (ed.), *Current Issues in Shipping, Ports and Logistics*, University Press Antwerp, Antwerp, pp. 11-24.

World Bank 2014, *Trading economics*, 2014 edn, World Bank, US, 7/08/2015, <<http://www.tradingeconomics.com/ghana/exports-of-goods-and-services-percent-of-gdp-wb-data.html>>.

World Bank 2015, *World development indicators*, Knoema, viewed 11/05/2017 <<https://knoema.com/WBWDIGDF2015Aug/world-development-indicators-wdi-september-2015?tsId=1578480>>.

Wu, H-J & Dunn, SC 1995, 'Environmentally responsible logistics systems', *International Journal of Physical Distribution & Logistics Management*, vol. 25, no. 2, pp. 20-38.

Xu, Z & Lai, X 2015, 'Purchasing transportation services from ocean carriers', in *Handbook of Ocean Container Transport Logistics*, Springer, Switzerland, pp. 399-427.

Yang, C-C 2012a, 'Assessing the moderating effect of innovation capability on the relationship between logistics service capability and firm performance for ocean

freight forwarders', *International Journal of Logistics Research and Applications*, vol. 15, no. 1, pp. 53-69.

Yang, C-C 2012b, 'The effect of environmental management on environmental performance and firm performance in Taiwanese maritime firms', *International Journal of Shipping and Transport Logistics*, vol. 4, no. 4, pp. 393-407.

Yang, C-C, Marlow, PB & Lu, C-S 2009, 'Knowledge management enablers in liner shipping', *Transportation Research Part E: Logistics and Transportation Review*, vol. 45, no. 6, pp. 893-903.

Yang, C-C, Tai, H-H & Chiu, W-H 2014, 'Factors influencing container carriers' use of coastal shipping', *Maritime Policy & Management*, vol. 41, no. 2, pp. 192-208.

Yang, C-S, Lu, C-S, Xu, J & Marlow, PB 2013, 'Evaluating green supply chain management capability, environmental performance, and competitiveness in container shipping context', *Journal of the Eastern Asia Society for Transportation Studies*, vol. 10, no. 1, pp. 2274-2293.

Yang, F, Yang, M, Xia, Q & Liang, L 2015, 'Collaborative distribution between two logistics service providers', *International Transactions in Operational Research*, vol. 1, no. 00, pp. 1-26.

Yang, Q & Zhao, X 2016, 'Are logistics outsourcing partners more integrated in a more volatile environment?', *International Journal of Production Economics*, vol. 171, no. 2, pp. 211-220.

Yang, Y-C & Sung, C-Y 2016, 'Service quality improvement strategies for liner-carrier-based global logistics companies', *International Journal of Shipping and Transport Logistics*, vol. 8, no. 4, pp. 456-487.

Yeung, K, Zhou, H, Yeung, AC & Cheng, T 2012, 'The impact of third-party logistics providers' capabilities on exporters' performance', *International Journal of Production Economics*, vol. 135, no. 2, pp. 741-753.

Yin, RK 2014, *Case study research: Design and methods*, 5th Edition edn, Sage publications Ltd, London.

Yong, AG & Pearce, S 2013, 'A beginner's guide to factor analysis: Focusing on exploratory factor analysis', *Tutorials in Quantitative Methods for Psychology*, vol. 9, no. 2, pp. 79-94.

Yu, J & Cooper, H 1983, 'A quantitative review of research design effects on response rates to questionnaires', *Journal of Marketing Research*, vol. 20, no. 1, pp. 36-44.

Yuen, KF, Thai, VV & Dahlgaard-Park, SM 2015, 'Service quality and customer satisfaction in liner shipping', *International Journal of Quality and Service Sciences*, vol. 7, no. 2/3, pp. 1-16.

Zhang, A & Lam, JSL 2014, 'Impacts of Schedule Reliability and Sailing Frequency on the Liner Shipping and Port Industry', *Transportation Journal*, vol. 53, no. 2, pp. 235-253.

Zhang, A & Lam, JSL 2015, 'Daily Maersk's impacts on shipper's supply chain inventories and implications for the liner shipping industry', *Maritime Policy & Management*, vol. 42, no. 3, pp. 246-262.

Zhao, X, Steckel, KE & Prasad, A 2012, 'Lead time and price quotation mode selection: Uniform or differentiated?', *Production and Operations Management*, vol. 21, no. 1, pp. 177-193.

Zikmund, W, Babin, B, Carr, J & Griffin, M 2013, *Business research methods*, Ninth edn, Cengage Learning, Canada.

Zimmer, K 2002, 'Supply chain coordination with uncertain just-in-time delivery', *International Journal of Production Economics*, vol. 77, no. 1, pp. 1-15.

Zsidisin, GA, Voss, MD & Schlosser, M 2007, 'Shipper-carrier relationships and their effect on carrier performance', *Transportation Journal*, vol. 46, no. 2, pp. 5-18.

Zurheide, S & Fischer, K 2012, 'A revenue management slot allocation model for liner shipping networks', *Maritime Economics & Logistics*, vol. 14, no. 3, pp. 334-361.

APPENDICES

APPENDIX A ETHICS APPROVAL

Social Science Ethics Officer
Private Bag 01 Hobart
Tasmania 7001 Australia
Tel: (03) 6225 2763
Fax: (03) 6225 7148
Kathrine.Shaw@utas.edu.au



HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

06 July 2015

Dr Thanh Nguyen
Maritime and Logistics Management
Private Bag 1397

Dear Dr Nguyen

Re: MINIMAL RISK ETHICS APPLICATION APPROVAL

Ethics Ref: H0015046 - Competitiveness of Liner Operators in Ghana: Freight Forwarders' Perspective

We are pleased to advise that acting on a mandate from the Tasmania Social Sciences HREC, the Chair of the committee considered and approved the above project on 06 July 2015.

This approval constitutes ethical clearance by the Tasmania Social Sciences Human Research Ethics Committee. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approval of other bodies or authorities is required. It is recommended that the proposed research should not commence until you have satisfied those requirements.

Please note that this approval is for four years and is conditional upon receipt of an annual Progress Report. Ethics approval for this project will lapse if a Progress Report is not submitted.

The following conditions apply to this approval. Failure to abide by these conditions may result in suspension or discontinuation of approval.

1. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval, to ensure the project is conducted as approved by the Ethics Committee, and to notify the Committee if any investigators are added to, or cease involvement with, the project.

A PARTNERSHIP PROGRAM IN CONJUNCTION WITH THE DEPARTMENT OF HEALTH AND HUMAN SERVICES

-
2. Complaints: If any complaints are received or ethical issues arise during the course of the project, Investigators should advise the Executive Officer of the Ethics Committee on 05 6226 7479 or human.ethics@utas.edu.au.
 3. Incidents or adverse effects: Investigators should notify the Ethics Committee immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
 4. Amendments to Project: Modifications to the project must not proceed until approval is obtained from the Ethics Committee. Please submit an Amendment Form (available on our website) to notify the Ethics Committee of the proposed modifications.
 5. Annual Report: Continued approval for this project is dependent on the submission of a Progress Report by the anniversary date of your approval. You will be sent a courtesy reminder closer to this date. **Failure to submit a Progress Report will mean that ethics approval for this project will lapse.**
 6. Final Report: A Final Report and a copy of any published material arising from the project, either in full or abstract, must be provided at the end of the project.

Yours sincerely

Natasha Jones
Ethics Officer
Tasmania Social Sciences HREC

A PARTNERSHIP PROGRAM IN CONJUNCTION WITH THE DEPARTMENT OF HEALTH AND HUMAN SERVICES



Ethics approval
letter.pdf

APPENDIX A1 ETHICS MINIMUM RISK APPLICATION



HUMAN RESEARCH ETHICS COMMITTEE
(TASMANIA) NETWORK

SOCIAL SCIENCE HREC MINIMAL RISK APPLICATION

Important: Please send an electronic version of this form as a Word document along with all attachments to katherine.shaw@utas.edu.au.

A signed copy of this form also needs to be forwarded electronically.

If you have any questions, please call: 6226 2763

1. Title of proposed investigation
Please be concise but specific. Titles should be consistent with those used on any external funding application.
Competitiveness of Liner Operators in Ghana: The Perspective of Freight Forwarders

2. Expected commencement date:	Expected completion date of project
[29 June, 2015]	[30 July, 2015]

3. Investigators:	
A. Chief Investigator (Note: This is the researcher with ultimate responsibility for the project. The CI may not be a student)	
Given Name	Surname
Hong-Oanh	Nguyen
Staff Position:	Senior Lecturer Qualifications: PhD
Staff ID:	02377906
School & Division:	Ports and Shipping /Maritime and Logistics Management
Contact Address:	Locked bag 1397 Newnham, Launceston TAS 7248
Telephone:	03 6324 9762 Email: o.nguyen@utas.edu.au (Required)

A. Co-Investigator(s)		
i) Given Name	Surname	
Stephen	Cahoon	
Staff Position:	Senior Lecturer	Qualifications: PhD
Staff ID:		
Contact Address:	Locked bag 1397 Newnham, Launceston TAS 7248	
Telephone:	+61363249720	Email: S.Cahoon@amc.edu.au (Required)
ii) Given Name		
Surname		
Staff Position:		
Qualifications:		
Staff ID:		
Contact Address:		
Telephone:	Email: (Required)	
C. Student Investigator(s):		
i) Given Name	Surname	
Peter Dzakah	FANAM	
Gender:	Male	Date of Birth: 25 April 1978 Preferred Title: Mr Mr / Ms / Miss /Mrs /Dr
Student Number:	200929	Level: PhD Undergraduate / Hons / Masters / Postgraduate Diploma / PhD
School:	Australian Maritime College	
Contact Address:	AMC 7250 Launceston, Tasmania	
Telephone:	+61 (0) 469 553 251	Email: peter.fanam@utas.edu.au (Required)

APPENDIX A2 PARTICIPANT INFORMATION SHEET

Locked Bag 1397
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Email: peter.fanam@utas.edu.au



PARTICIPANT INFORMATION SHEET

Competitiveness of Liner Operators in Ghana: Freight Forwarders' Perspective

1. Invitation

You are invited to participate in this voluntary online survey about your views on shipping line's competitiveness. Your input to this survey is highly valuable to this research as it will provide an insight into the competitiveness of liner shipping services and how freight forwarders choose their shipping lines. The study is being conducted in partial fulfilment of the PhD degree by Peter Dzakah Fanam under the supervision of Dr. Owen Nguyen and Dr. Stephen Cahoon from the Department of Maritime and Logistics Management, Australian Maritime College, University of Tasmania.

2. What is the purpose of this study?

The main purpose of this research is to study the competitiveness of shipping lines' from the freight forwarders' perspective. In particular, the survey seeks freight forwarders' views on the important factors freight forwarders consider when choosing shipping lines for their clients. The study also seeks further to analyse the weight of importance that freight forwarders' attach to each factor when selecting shipping lines.

3. Why have I been invited to participate?

You are invited to participate in this study because you have been identified as an experts and key stakeholders in the Ghanaian shipping industry, and you work for a freight forwarding company in Ghana. Therefore, your views are valuable for shipping lines seeking to improve their service quality, customer satisfaction and competitiveness in the maritime sector in Ghana. The input from yourself and other participants will be beneficial in identifying the factors that are influential to freight forwarders when choosing shipping companies.

4. What will I be asked to do?

This study needs your participation by completing an on-line survey on the factors freight forwarders may consider when choosing a shipping line. You will be asked to tick boxes reflecting your level of agreement with a number of statements as

well as to answer 5 open ended questions. The survey will take only 15 minutes to complete. If you wish to take part in the study, simply click on the web link indicated in the email and follow the instruction. Receiving your completed questionnaire implies your consent for participating in this survey.

5. Are there any possible benefits from participation in this study?

Your participation in this study will provide an insight into the important factors freight forwarders consider when choosing ocean carriers and this will enable shipping companies to provide the required shipping service to meet customers' needs for liner shipping services in Ghana. The results of this study will be presented in a summary form and shall be made available to you upon request.

6. Are there any possible risks from participation in this study?

There are no specific risks anticipated with participation in this study.

7. What if I change my mind during or after the study?

We would like you to know that your involvement in this study is voluntary. Therefore, there will be no consequences to you if you decide not to participate, and if you decide to discontinue participation at any time, you may do so without providing an explanation.

8. What will happen to the information when this study is over?

All data will be kept in a password-protected computer file within the National Centre of Port and Shipping, Department of Maritime and Logistics Management, Australian Maritime College at the University of Tasmania. All data will be destroyed five years after the data has been first published. All information will be treated confidentially and your anonymity and privacy will be strictly protected.

9. How will the results of the study be published?

This study constitutes the source of primary information and data for the student investigator's doctoral thesis. The findings may later be presented or published at conferences and in other academic papers, including journals. Copies of such publications can be supplied upon request to any participant in the study.

10. What if I have questions about this study?

If you would like to discuss any aspect of this study please feel free to contact the student investigator or chief investigator/co-investigator:

STUDENT INVESTIGATOR:

Peter Dzakah Fanam, PhD Candidate

Department of Maritime and Logistics

Management, Ph: +61469553251

Email: peter.fanam@utas.edu.au

CHIEF INVESTIGATOR:

Dr. Owen H. Nguyen,
Acting Deputy Director
Department of Maritime and Logistics
Management, Ph: +61363249762
Email: o.nguyen@utas.edu.au

CO-INVESTIGATOR:

Dr. Stephen Cahoon
Senior Lecturer
Department of Maritime and Logistics
Management, Ph: +61363249720
Email: S.Cahoon@amc.edu.au

This study has been approved by the Tasmanian Social Science Human Research Ethics Committee with reference number H0015046. If you have concerns or complaints about the conduct of this study you can contact the Executive Officer of the HREC (Tasmania) Network on +61 3 6226 6254 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Please quote above mentioned reference number when contacting the Executive Officer with regards to this research.

Thank you for taking the time to consider this study.

If you wish to take part in this voluntary survey, please sign the attached consent form.

This information sheet is for you to keep.

APPENDIX B1 PRE-TEST SURVEY

Locked Bag 1397
Launceston Tasmania 7250 Australia
www.amc.edu.au
Phone: +61 (0) 469 553 251
Email: peter.fanam@utas.edu.au



Invitation to Pre-Testing of Survey

Competitiveness of Liner Operators in Ghana: Freight Forwarders' Perspective

Dear Sir/Madam,

I kindly invite you to participate in pre-testing of a survey instrument. For the purpose of pre-testing, kindly complete the whole instrument as though you were a freight forwarder. The aim of this survey is to develop a framework to enhance competitiveness of liner shipping companies operating in Ghana.

This research is important to liner shipping companies for various reasons. First, liner shipping companies' understanding of carrier selection criteria will enable them to develop a more precise marketing strategy to enhance their competitiveness in the liner shipping sector. It is important for shipping lines to understand the effect of carrier selection factors on their competitiveness. Second, in time of market downturn, this study will provide shipping companies with a better understanding of the factors that are important to their customers' carrier selection decision. Based on this research shipping companies can strategize and improve their competitiveness, service quality and consumer satisfaction. Third, the result of this study will not only enable shipping companies to provide required transport service to their customers but shall also enable shipping companies to increase their market share in the maritime transport sector.

There are four sections in this survey, consisting of the respondent's organisation profile, factors influential to freight forwarders' choice of shipping lines, views on challenges in choosing the right shipping lines and the respondent's profile. Please give your valuable feedback on;

1. The time you have spent on the survey.
2. Clarity or inappropriateness in language.
3. Any difficulties you had in the process?
4. Any other comments.

Dear participant, I really appreciate your interest and time for this exercise. Your comments will be really helpful to gain a high response rate and highly valuable feedback. If you have any question about the survey, please feel free to send an email to me peter.fanam@utas.edu.au.

Thank you for your valuable contribution in advance.

Yours faithfully,

Peter Dzakah Fanam,
PhD Candidate
Australian Maritime College
University of Tasmania
peter.fanam@utas.edu.au

APPENDIX B2 PRE-NOTIFICATION EMAIL

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PRE-NOTIFICATION EMAIL

Competitiveness of Liner Operators in Ghana: Freight Forwarders' Perspective

June, 2015

Dear Sir/Madam,

My name is Peter Dzakah Fanam and I am a doctoral candidate from the Australian Maritime College at the University of Tasmania, conducting research on the competitiveness of liner operators in Ghana from the freight forwarders' perspective. I would like to invite you to participate in a voluntary online survey about your experience as a freight forwarder.

In one week's time, you will receive an email with the survey link. Your input to this survey is highly valuable to this research as it will provide an insight on how freight forwarders make decisions when they choose a shipping line for their clients. The results will be presented in a summary form and shall be made available to you upon request. A separate link shall be provided for you to click to provide your email address if you would like to receive a copy of the survey report.

The main purpose of this research is to assess the competitiveness of shipping lines from the freight forwarders' perspective through the identification of the important factors freight forwarders consider when choosing a shipping line. You will be asked to tick boxes reflecting your level of agreement with a number of statements as well as to answer 5 open ended questions.

The completion of the survey will take approximately 15 minutes of your time. No details will be collected which can be used to identify you personally. All information will be treated confidentially and your anonymity and privacy will be strictly protected. In addition to the fact that no identifiable data will be obtained, all data will be kept in a password-protected computer file within the National Centre of Port and Shipping, Department of Maritime and Logistics Management, Australian Maritime College and will be destroyed five years after the data has been

first published. We anticipated that your participation in this study presents no specific risks.

If you have any question about the survey, please do not hesitate to send an email to me (peter.fanam@utas.edu.au).

Thank you in advance for your valuable contribution.

Yours faithfully,

STUDENT INVESTIGATOR:

Peter Dzakah Fanam, PhD Candidate
Department of Maritime and Logistics
Management, Ph: +61469553251
Email: peter.fanam@utas.edu.au

CHIEF INVESTIGATOR:

Dr. Owen H. Nguyen,
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CO-INVESTIGATOR:

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APPENDIX B3 EMAIL INVITATION

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EMAIL INVITATION

Competitiveness of Liner Operators in Ghana: Freight Forwarders' Perspective

June, 2015

Dear Sir/Madam,

You are invited to participate in a voluntary online survey that focuses on your experience as a freight forwarder. Your input to this survey is valuable as it will provide an insight on how freight forwarders make their decision when they choose a shipping line for their clients.

The main purpose of this research is to assess the competitiveness of shipping lines from the freight forwarders' perspective and also to identify the important factors freight forwarders consider when choosing a shipping line. You will be asked to tick boxes reflecting your level of agreement with a number of statements as well as to answer 5 open-ended questions. Completing this survey will take approximately 15 minutes of your time.

All information will be treated confidentially and your anonymity and privacy will be strictly protected. In addition to the fact that no identifiable data will be obtained, all data will be kept in a password-protected computer file and will be destroyed five years after the data has been first published. We anticipated that your participation in this study presents no specific risks.

This study has been approved by the Tasmanian Social Science Human Research Ethics Committee with reference number H0015046. If you have concerns or complaints about the conduct of this study you can contact the Executive Officer of the HREC (Tasmania) Network on +61 3 6226 6254 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Please quote above-mentioned reference number when contacting the Executive Officer with regards to this research.

The results of this study will be presented in a summary form and shall be made available to you upon request. Please click on the “agree” button in the email to indicate your consent to participate in this survey.

Thank you in advance for your valuable contribution.

Yours faithfully,

STUDENT INVESTIGATOR:

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APPENDIX B4 SOFT REMINDER LETTER TO BE SENT TO SAMPLE POPULATION

Locked Bag 1397
Launceston Tasmania 7250 Australia
www.amc.edu.au
Mobile phone: +61 (0) 469 553 251
Email: peter.fanam@utas.edu.au



SOFT REMINDER LETTER TO BE SENT TO SAMPLE POPULATION

*Email subject: 15 minutes of your time needed to complete an online survey on
competitiveness of liner operators in Ghana*

Dear Sir/Madam,

About two weeks ago, I sent you an email inviting you to participate in a survey on the competitiveness of liner operators in Ghana from the freight forwarders' perspective. **If you have completed and submitted your questionnaire then, thank you!** If you have not done so, could you please spend **15 minutes** to answer the questions that will assist in gaining a better understanding for what is important to you when selecting liner operators?

The survey is available online at <https://competitive.....com>. If you have any problem accessing this website, please let me know.

Although, your participation is completely voluntary, I would be very grateful if you could take the time to share your views. Securing the most meaningful and useful results will require the broadest possible participation and your own response is, therefore, essential. All individual responses collected through this survey will be kept **strictly confidential**.

If you have any questions about the survey or the research, please feel free to send an email to me (peter.fanam@utas.edu.au).

Thank you in advance for your valuable contribution.

Yours faithfully,

Peter Dzakah Fanam,
PhD Candidate
Australian Maritime College
University of Tasmania
Email: peter.fanam@utas.edu.au

APPENDIX C QUESTIONNAIRE

COMPETITIVENESS OF LINER OPERATORS IN GHANA: FREIGHT FORWARDERS' PERSPECTIVE

This survey is part of a doctoral research on the competitiveness of shipping lines from the freight forwarders' perspective. The purpose of this survey is to ascertain the factors that freight forwarders consider important to their decision when choosing shipping lines for their clients. All responses provided to the questions in this survey are private and confidential.

The survey has four sections and should take approximately 15 minutes to complete. Your participation is invaluable to the research and would be highly appreciated.

SECTION A: ORGANISATIONAL PROFILE

This section includes general questions on your organisation.

Please select the option most suitable to your organisation.

A1	How many employees work in your organisation?	
A1.1	1 – 20	<input type="checkbox"/>
A1.2	21 – 40	<input type="checkbox"/>
A1.3	41 – 60	<input type="checkbox"/>
A1.4	61 – 80	<input type="checkbox"/>
A1.5	81 – 100	<input type="checkbox"/>
A1.6	101 – 120	<input type="checkbox"/>
A1.7	121 and above	<input type="checkbox"/>

A2		Number of years your organisation is in operation
A2.1	1 – 5	<input type="checkbox"/>
A2.2	6 – 10	<input type="checkbox"/>
A2.3	11 – 15	<input type="checkbox"/>
A2.4	16 – 20	<input type="checkbox"/>
A2.5	21 – 25	<input type="checkbox"/>
A2.6	26 – 30	<input type="checkbox"/>
A2.7	31 and above	<input type="checkbox"/>

A3		Type of business provided by your organisation (Please tick all applicable boxes)
A3.1	Freight forwarding	<input type="checkbox"/>
A3.2	Shipping agency	<input type="checkbox"/>
A3.3	Non Vessel Operating Common Carrier (NVOCC)	<input type="checkbox"/>
A3.4	Customs broker	<input type="checkbox"/>
A3.5	Cargo consolidator	<input type="checkbox"/>
A3.6	Legal counsellor	<input type="checkbox"/>
A3.7	Other (Please specify?)	

A4 Type of services provided by your organisation (Please tick all applicable boxes)	
A4.1	Import clearance <input type="checkbox"/>
A4.2	Export clearance <input type="checkbox"/>
A4.3	Warehousing <input type="checkbox"/>
A4.4	Road haulage <input type="checkbox"/>
A4.5	Inventory management <input type="checkbox"/>
A4.6	Vessel operation <input type="checkbox"/>
A4.7	Other (Please specify?)

SECTION B: FACTORS INFLUENTIAL TO FREIGHT FORWARDERS' CHOICE OF SHIPPING LINES

Please rate the importance of the following factors when selecting your ocean carriers - from 1 – 5, where 1 is “strongly disagree” and 5 is “strongly agree”.

B		Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
B1	On time pick-up by shipping line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2	On time delivery by shipping line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B3	Ability to coordinate other actors, e.g. terminal operators, stevedore, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B4	Direct sailing (port to port)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B5	Shipping line ability to obtain berth on arrival	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B6	Service schedule reliability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B7	Availability of door-to-door or multimodal transport services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B8	Frequency of port calls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B9	Transit time (port to port)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B10	Competitive freight rates and charges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B11	Transparency of freight rates and charges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B12	Simplicity of freight rates and their structure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B13	Container detention free period	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B14	On-time quoting of rates and charges by shipping lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B15	On-time invoicing by the shipping line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B16	On time issuing of the Bill of Lading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B17	Professionalism of carriers staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B18	Carriers staff knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B19	Shipping company reputation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B20	Ability of carriers staff in problem solving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B21	Prompt response to customers' complaints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B22	Staff's politeness and courtesy to clients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B23	Quality and capacity of cargo handling facilities and equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B24	Cargo's safety management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B25	Shipping line provision of emergency services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B26	Cargo tracking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B27	Shipping line ability to provide late hours service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B28	Environmentally friendly operations by shipping line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B29	Carriers commitment in reducing CO2 emissions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B30	Carriers' using renewable energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B31	Availability of online booking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B32	On-time information sharing on arrival and departure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B33	Accuracy of shipping documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B34	Geographical coverage by shipping line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B35	On time submission of cargo manifest by shipping line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B36	Dedicated berth by shipping line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B37	On time release of shipping documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B38	Ability to provide freight and logistics services to different other types of cargo e.g. flat racks, open top containers, dangerous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	goods, etc.					
B39	Corporate social responsibility by shipping line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION C: OPEN ENDED QUESTIONS

C1 In addition to the 39 factors mentioned in the survey, what other factors would you consider important to your choice of shipping lines?

.....

.....

.....

C2 What are the challenges in choosing the right shipping lines for your customers?

.....

.....

.....

C3 What aspects of their shipping services can be improved?

.....

.....

.....

C4 How does shipping lines' good relationship with other transport stakeholders (port authorities, terminal operators, road haulers and customs) affect your carrier selection?

.....

.....

.....

C5 If you wish. Please feel free to write any comments you feel may be relevant to this study.

.....

.....

.....

SECTION D: RESPONDENT'S PROFILE

Please tick applicable box.

D1	Your position in the organisation	
D1.1	Director / CEO	<input type="checkbox"/>
D1.2	Manager	<input type="checkbox"/>
D1.3	Sales/Marketing executive	<input type="checkbox"/>
D1.4	Supervisor	<input type="checkbox"/>
D1.5	Administration	<input type="checkbox"/>
D1.6	Other	<input type="checkbox"/>

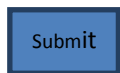
D2	Years of work experience in the freight forwarding sector	
D2.1	1- 5 years	<input type="checkbox"/>
D2.2	6-10 years	<input type="checkbox"/>
D2.3	11-15 years	<input type="checkbox"/>

D2.4	16-20 years	<input type="checkbox"/>
D2.5	21-30 years	<input type="checkbox"/>
D2.6	31 years & above	<input type="checkbox"/>

Concluding remarks

This is the end of this survey. Please do not forget to click on [submit](#).

Thank you for your participation.

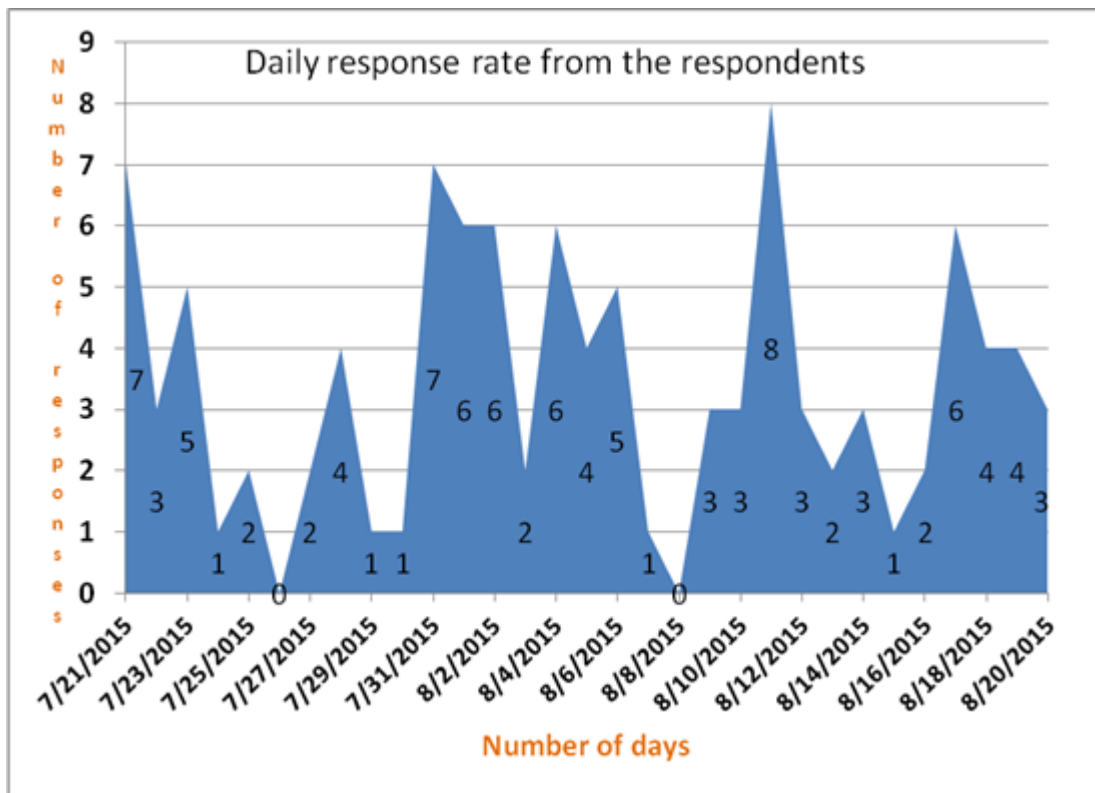


The results will be presented in a summary form and shall be made available to you upon request. I am more than happy to send you a copy. Please click on <https://.....com> to provide your email address if you would like to receive a copy of the survey report when it is available.

The link above is separate from this survey to protect your anonymity.

APPENDIX D

FIGURE D DAILY RESPONSE RATES OF THE SURVEY PARTICIPANTS



APPENDIX E

TABLE E-1 CASE PROCESSING SUMMARY – MISSING DATA - (APPENDIX E)

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
On time pick-up by shipping line	105	100.0%	0	0.0%	105	100.0%
On time delivery by shipping line	105	100.0%	0	0.0%	105	100.0%
Direct sailing (port to port)	105	100.0%	0	0.0%	105	100.0%
Shipping line ability to obtain berth on arrival	105	100.0%	0	0.0%	105	100.0%
Dedicated berth by shipping line	105	100.0%	0	0.0%	105	100.0%
Availability of door-to-door or multimodal transport services	105	100.0%	0	0.0%	105	100.0%
Ability to coordinate other actors, e.g. terminal operators, stevedore, etc.	105	100.0%	0	0.0%	105	100.0%
Geographical coverage by shipping line	105	100.0%	0	0.0%	105	100.0%
Ability to provide freight and logistics services to different other types of cargo e.g. flat racks, open top containers, dangerous goods, etc.	105	100.0%	0	0.0%	105	100.0%
Frequency of port calls	105	100.0%	0	0.0%	105	100.0%
Transit time (port to port)	105	100.0%	0	0.0%	105	100.0%
Competitive freight rates and charges	105	100.0%	0	0.0%	105	100.0%
Transparency of freight rates and charges	105	100.0%	0	0.0%	105	100.0%
Simplicity of freight rates and their structure	105	100.0%	0	0.0%	105	100.0%
Container detention free period	105	100.0%	0	0.0%	105	100.0%
On-time quoting of rates and charges by shipping lines	105	100.0%	0	0.0%	105	100.0%
Service schedule reliability	105	100.0%	0	0.0%	105	100.0%
On-time invoicing by the shipping line	105	100.0%	0	0.0%	105	100.0%
On-time issuing of the Bill of Lading	105	100.0%	0	0.0%	105	100.0%
On time submission of cargo manifest by shipping line	105	100.0%	0	0.0%	105	100.0%
On time release of shipping documents	105	100.0%	0	0.0%	105	100.0%
Professionalism of carriers staff	105	100.0%	0	0.0%	105	100.0%
Carriers staff knowledge	105	100.0%	0	0.0%	105	100.0%
Shipping company reputation	105	100.0%	0	0.0%	105	100.0%
Ability of carriers staff in problem solving	105	100.0%	0	0.0%	105	100.0%
Prompt response to customers' complaints	105	100.0%	0	0.0%	105	100.0%
Staff's politeness and courtesy to clients	105	100.0%	0	0.0%	105	100.0%
Shipping line provision of emergency services	105	100.0%	0	0.0%	105	100.0%
Shipping line ability to provide late hours service	105	100.0%	0	0.0%	105	100.0%

Quality and capacity of cargo handling facilities and equipment	105	100.0%	0	0.0%	105	100.0%
Cargo's safety management	105	100.0%	0	0.0%	105	100.0%
Cargo tracking	105	100.0%	0	0.0%	105	100.0%
Availability of online booking	105	100.0%	0	0.0%	105	100.0%
On-time notice on arrival and departure information	105	100.0%	0	0.0%	105	100.0%
Accuracy of shipping documents	105	100.0%	0	0.0%	105	100.0%
Environmentally friendly operations by shipping line	105	100.0%	0	0.0%	105	100.0%
Carriers commitment in reducing CO2 emissions	105	100.0%	0	0.0%	105	100.0%
Carriers' using renewable energy	105	100.0%	0	0.0%	105	100.0%
Corporate social responsibility by shipping line	105	100.0%	0	0.0%	105	100.0%

TABLE E-2 INITIAL COMMUNALITIES – (APPENDIX E)

	Initial	Extraction
On time pick-up by shipping line	1	0.85
On time delivery by shipping line	1	0.69
Direct sailing (port to port)	1	0.71
Shipping line ability to obtain berth on arrival	1	0.65
Dedicated berth by shipping line	1	0.75
Availability of door-to-door or multimodal transport services	1	0.74
Ability to coordinate other actors, e.g. terminal operators, stevedore, etc.	1	0.66
Geographical coverage by shipping line	1	0.69
Ability to provide freight and logistics services to different other types of cargo e.g. flat racks, open top containers, dangerous goods, etc.	1	0.67
Frequency of port calls	1	0.79
Transit time (port to port)	1	0.81
Competitive freight rates and charges	1	0.84
Transparency of freight rates and charges	1	0.68
Simplicity of freight rates and their structure	1	0.71
Container detention free period	1	0.82
On-time quoting of rates and charges by shipping lines	1	0.66
Service schedule reliability	1	0.73
On-time invoicing by the shipping line	1	0.71
On-time issuing of the Bill of Lading	1	0.79
On time submission of cargo manifest by shipping line	1	0.64
On time release of shipping documents	1	0.78
Professionalism of carriers staff	1	0.67
Carriers staff knowledge	1	0.68
Shipping company reputation	1	0.62
Ability of carriers staff in problem solving	1	0.82
Prompt response to customers' complaints	1	0.74
Staff's politeness and courtesy to clients	1	0.72
Shipping line provision of emergency services	1	0.62

Shipping line ability to provide late hours service	1	0.77
Quality and capacity of cargo handling facilities and equipment	1	0.71
Cargo's safety management	1	0.77
Cargo tracking	1	0.68
Availability of online booking	1	0.82
On-time notice on arrival and departure information	1	0.75
Accuracy of shipping documents	1	0.66
Environmentally friendly operations by shipping line	1	0.81
Carriers commitment in reducing CO2 emissions	1	0.82
Carriers' using renewable energy	1	0.82
Corporate social responsibility by shipping line	1	0.74

**TABLE E-3 SIX FACTOR ROTATED
COMMUNALITIES - (APPENDIX E)**

	Initial	Extraction
Shipping line provision of emergency services	1.000	.614
Professionalism of carriers staff	1.000	.692
Carriers staff knowledge	1.000	.646
Carriers' using renewable energy	1.000	.873
Carriers commitment in reducing CO2 emissions	1.000	.857
Environmentally friendly operations by shipping line	1.000	.773
Frequency of port calls	1.000	.749
Cargo tracking	1.000	.746
On-time invoicing by the shipping line	1.000	.694
Availability of door-to-door or multimodal transport services	1.000	.824
Dedicated berth by shipping line	1.000	.794
Transparency of freight rates and charges	1.000	.792
Simplicity of freight rates and their structure	1.000	.722
Accuracy of shipping documents	1.000	.793
Quoting of freight rates and charges on time by shipping line	1.000	.728
Service schedule reliability	1.000	.766

Extraction Method: Principal Component Analysis.

TABLE E-4 CORRELATION CO-EFFICIENT (APPENDIX E)

B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18
1.000	.728	.562	.447	.083	.117	.281	.389	.280	.529	.644	.490	.404	.359	.403	.511	.673	.435
.728	1.000	.517	.364	.164	.140	.256	.362	.257	.521	.644	.404	.510	.486	.473	.519	.609	.469
.562	.517	1.000	.400	.214	.300	.332	.416	.132	.385	.647	.454	.361	.376	.548	.498	.598	.344
.447	.364	.400	1.000	.326	.336	.338	.248	.129	.173	.332	.264	.245	.294	.224	.317	.397	.255
.083	.164	.214	.326	1.000	.420	.284	.065	.277	.053	-.001	.071	.224	.343	.164	.205	.066	.284
.117	.140	.300	.336	.420	1.000	.374	.298	.257	.172	.169	.118	.138	.139	.235	.184	.206	.244
.281	.256	.332	.338	.284	.374	1.000	.540	.369	.366	.332	.176	.391	.418	.284	.235	.398	.262
.389	.362	.416	.248	.065	.298	.540	1.000	.341	.519	.556	.389	.403	.371	.420	.307	.536	.243
.280	.257	.132	.129	.277	.257	.369	.341	1.000	.290	.153	.151	.203	.223	.197	.233	.271	.295
.529	.521	.385	.173	.053	.172	.366	.519	.290	1.000	.709	.568	.443	.296	.456	.453	.537	.476
.644	.644	.647	.332	-.001	.169	.332	.556	.153	.709	1.000	.704	.602	.448	.583	.427	.604	.430
.490	.404	.454	.264	.071	.118	.176	.389	.151	.568	.704	1.000	.471	.321	.505	.466	.489	.417
.404	.510	.361	.245	.224	.138	.391	.403	.203	.443	.602	.471	1.000	.516	.423	.274	.401	.312
.359	.486	.376	.294	.343	.139	.418	.371	.223	.296	.448	.321	.516	1.000	.476	.283	.437	.401
.403	.473	.548	.224	.164	.235	.284	.420	.197	.456	.583	.505	.423	.476	1.000	.513	.533	.373
.511	.519	.498	.317	.205	.184	.235	.307	.233	.453	.427	.466	.274	.283	.513	1.000	.642	.430
.673	.609	.598	.397	.066	.206	.398	.536	.271	.537	.604	.489	.401	.437	.533	.642	1.000	.368
.435	.469	.344	.255	.284	.244	.262	.243	.295	.476	.430	.417	.312	.401	.373	.430	.368	1.000
.391	.422	.195	.338	.392	.166	.279	.250	.479	.320	.338	.443	.344	.345	.344	.332	.336	.556
.461	.397	.308	.316	.183	.098	.382	.350	.161	.349	.385	.370	.260	.330	.391	.377	.399	.390
.656	.525	.593	.324	.140	.076	.320	.385	.327	.573	.654	.614	.367	.421	.555	.561	.537	.581
.283	.339	.162	.222	.398	.218	.265	.252	.453	.264	.265	.279	.266	.474	.319	.354	.353	.444
.252	.245	.220	.305	.315	.228	.369	.283	.365	.285	.284	.354	.352	.472	.358	.296	.314	.375
.252	.259	.254	.151	.177	-.023	.160	.225	.315	.288	.291	.369	.364	.423	.414	.355	.405	.215
.423	.456	.375	.403	.108	.173	.271	.448	.248	.436	.519	.623	.462	.480	.640	.510	.540	.306
.603	.522	.496	.390	.089	.139	.346	.467	.344	.472	.580	.602	.358	.452	.573	.549	.648	.409
.517	.470	.427	.378	.182	.219	.387	.499	.348	.473	.497	.512	.435	.548	.511	.460	.580	.449
.227	.229	.117	.135	.394	.196	.187	.058	.429	.183	.167	.169	.261	.328	.256	.315	.266	.310
.513	.409	.350	.230	-.004	.089	.243	.413	.219	.446	.502	.301	.376	.430	.486	.315	.482	.210
.591	.504	.405	.378	.259	.257	.330	.524	.334	.515	.516	.488	.422	.465	.422	.407	.573	.247
.582	.520	.552	.376	.171	.311	.452	.547	.346	.624	.610	.593	.429	.407	.574	.572	.662	.367
.387	.464	.280	.193	.192	.309	.408	.459	.378	.540	.410	.346	.316	.432	.389	.407	.563	.477
.049	.051	.130	.209	.419	.445	.262	.259	.406	.062	.037	.160	.010	.196	.201	.374	.269	.230
.555	.519	.553	.464	.244	.313	.383	.412	.342	.475	.566	.464	.287	.429	.577	.550	.619	.413
.458	.375	.553	.398	.073	.160	.381	.382	.152	.372	.520	.476	.300	.253	.479	.476	.555	.244
.021	.077	.070	.117	.287	.358	.283	.139	.323	.023	-.080	-.022	.108	.254	.107	.224	.137	.121
.078	.158	.062	.197	.307	.362	.398	.159	.345	.115	.042	.096	.150	.304	.000	.158	.187	.190
-.016	.058	.028	.162	.225	.307	.370	.115	.266	.032	-.029	-.026	.102	.261	-.032	.102	.139	.085
.219	.263	.335	.322	.062	.276	.416	.260	.059	.252	.300	.117	.223	.354	.245	.075	.194	.198

**TABLE E-5 PATTERN MATRIX^A TWO FACTORS
(APPENDIX E)**

	Component	
	1	2
On-time invoicing by the shipping line	.891	
Cargo tracking	.760	
Frequency of port calls	.681	
Accuracy of shipping documents		-.941
Service schedule reliability		-.714
On-time quoting of freight rates and charges by shipping lines		-.663

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 8 iterations.

APPENDIX F

TABLE F-1 INDEPENDENT SAMPLES TEST

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Response	Equal variances assumed	2.788	.105	.401	30	.691	.31250	.77912	-1.27868	1.90368
	Equal variances not assumed			.401	29.061	.691	.31250	.77912	-1.28084	1.90584

TABLE F-2 CORRELATIONS: (GROUP NUMBER 1 - DEFAULT MODEL)

Factors			Estimate
Service	<-->	Environment	0.495
Service	<-->	Scheduling	0.649
Service	<-->	Handling	0.618
Service	<-->	Freight Rates	0.714
Service	<-->	Documentation	0.511
Environment	<-->	Scheduling	0.349
Environment	<-->	Handling	0.471
Environment	<-->	Freight Rates	0.345
Environment	<-->	Documentation	0.211
Scheduling	<-->	Handling	0.39
Scheduling	<-->	Freight Rates	0.692
Scheduling	<-->	Documentation	0.785
Handling	<-->	Freight Rates	0.484
Handling	<-->	Documentation	0.219
Freight Rates	<-->	Documentation	0.603

TABLE F-3 STANDARDIZED REGRESSION WEIGHTS: (ALL - DEFAULT MODEL)

Factors	Estimate
B28 <--- Service	.598
B22 <--- Service	.778
B23 <--- Service	.772
B38 <--- Environ	.895
B37 <--- Environment	.950
B36 <--- Environment	.758
B10 <--- Scheduling	.695
B32 <--- Scheduling	.777
B18 <--- Scheduling	.640
B6 <--- Handling	.549
B5 <--- Handling	.764
B13 <--- Freight Rates	.641
B14 <--- Freight Rates	.805
B35 <--- Documentation	.617
B16 <--- Documentation	.722
B17 <--- Documentation	.898

TABLE F-4 SQUARED MULTIPLE CORRELATIONS: (GROUP NUMBER 1 - DEFAULT MODEL)

Item description	Factors	Estimate
B17 Service schedule reliability	Documentation	0.807
B16 On-time quoting of rates and charges by shipping lines	Documentation	0.521
B35 Accuracy of shipping documents	Documentation	0.381
B14 Simplicity of freight rates and their structure	Freight rates	0.647
B13 Transparency of freight rates and charges	Freight rates	0.411
B5 Dedicated berth by shipping line	Handling	0.584
B6 Availability of door-to-door or multimodal transport service	Handling	0.302
B18 On-time invoicing by the shipping line	Scheduling	0.409
B32 Cargo tracking	Scheduling	0.604
B10 Frequency of port calls	Scheduling	0.484
B36 Environmentally friendly operations by shipping lines	Environment	0.575
B37 Shipping lines commitment in reducing CO2 emissions	Environment	0.902
B38 Shipping lines using of renewable energy	Environment	0.800
B23 Shipping lines staff knowledge	Service quality	0.597
B22 Professionalism of shipping lines staff	Service quality	0.606
B28 Shipping line provision of emergency services	Service quality	0.357

TABLE F-5 VARIANCES: (ALL - DEFAULT MODEL)

	Estimate	S.E.	C.R.	P	Label
Service	.593	.195	3.048	.002	par_26
Environment	1.006	.179	5.612	***	par_27
Scheduling	.438	.119	3.684	***	par_28
Handling	.469	.196	2.395	.017	par_29
Freight Rates	.477	.150	3.176	.001	par_30
Documentation	.264	.081	3.236	.001	par_31
e1	1.066	.169	6.320	***	par_32
e2	.441	.092	4.778	***	par_33
e3	.411	.084	4.869	***	par_34
e4	.251	.060	4.172	***	par_35
e5	.137	.064	2.156	.031	par_36
e6	.610	.096	6.388	***	par_37
e7	.468	.081	5.742	***	par_38
e8	.408	.085	4.788	***	par_39
e9	.418	.068	6.121	***	par_40
e10	1.086	.193	5.632	***	par_41
e11	.801	.305	2.623	.009	par_42
e12	.682	.120	5.678	***	par_43
e13	.359	.113	3.187	.001	par_44
e14	.429	.067	6.434	***	par_45
e15	.403	.070	5.767	***	par_46
e16	.159	.061	2.595	.009	par_47

TABLE F-6 COVARIANCES: (ALL - DEFAULT MODEL)

	Estimate	S.E.	C.R.	P	Label
Service <--> Environ	.382	.112	3.400	***	par_11
Service <--> Scheduling	.331	.092	3.576	***	par_12
Service <--> Handling	.326	.115	2.827	.005	par_13
Service <--> Rates	.380	.109	3.497	***	par_14
Service <--> Docs	.202	.065	3.106	.002	par_15
Environ <--> Scheduling	.231	.085	2.712	.007	par_16

	Estimate	S.E.	C.R.	P	Label
Environ <--> Handling	.324	.117	2.767	.006	par_17
Environ <--> Rates	.239	.094	2.550	.011	par_18
Environ <--> Docs	.109	.060	1.809	.071	par_19
Scheduling<--> Handling	.177	.078	2.257	.024	par_20
Scheduling<--> Rates	.316	.087	3.632	***	par_21
Scheduling<--> Docs	.267	.067	3.993	***	par_22
Handling <--> Rates	.229	.093	2.473	.013	par_23
Handling <--> Docs	.077	.051	1.504	.132	par_24
Rates <--> Docs	.214	.064	3.322	***	par_25

TABLE F-7 MODEL FIT SUMMARY FOR MODIFIED MODEL
CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	33	139.377	103	.010	1.353
Saturated model	136	.000	0		
Independence model	16	797.523	120	.000	6.646

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.115	.849	.801	.643
Saturated model	.000	1.000		
Independence model	.368	.362	.277	.320

BASELINE COMPARISONS

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
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Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.825	.796	.948	.937	.946
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.059	.030	.082	.273
Independence model	.235	.220	.251	.000

TABLE F-8 STANDARDISED REGRESSION WEIGHTS

		Estimate
Service Quality	<--- Competitiveness	0.777
Environment	<--- Competitiveness	0.486
Scheduling Reliability	<--- Competitiveness	0.872
Quick Handling	<--- Competitiveness	0.611
Freight Rates	<--- Competitiveness	0.783
Documentation	<--- Competitiveness	0.785
B28	<--- Service Quality	0.516
B22	<--- Service Quality	0.784
B23	<--- Service Quality	0.774
B38	<--- Environment	0.902
B37	<--- Environment	0.946
B36	<--- Environment	0.762
B10	<--- Scheduling Reliability	0.62
B32	<--- Scheduling Reliability	0.784
B18	<--- Scheduling Reliability	0.656
B6	<--- Quick Handling	0.647
B5	<--- Quick Handling	0.66
B13	<--- Freight Rates	0.604
B14	<--- Freight Rates	0.819
B35	<--- Documentation	0.704
B16	<--- Documentation	0.756
B17	<--- Documentation	0.87

TABLE F-9 SQUARED MULTIPLE CORRELATIONS

	Estimate
Documentation	0.616
Freight Rates	0.613
Quick Handling	0.373
Scheduling Reliability	0.761
Environment	0.236
Service Quality	0.604
B17	0.757
B16	0.571
B35	0.496
B14	0.671
B13	0.365
B5	0.436
B6	0.418
B18	0.431
B32	0.615
B10	0.384
B36	0.58
B37	0.895
B38	0.814
B23	0.599
B22	0.615
B28	0.267

TABLE F-10 COMPARISON OF FIRST AND SECOND-ORDER MODELS

	First-Order Model		Second-order Model	
	CR	AVE	CR	AVE
Freight Rates	0.71	0.529	0.71	0.531
Service Quality	0.762	0.52	0.762	0.52
Environment	0.904	0.759	0.904	0.759
Schedule Reliability	0.748	0.51	0.709	0.552
Quick Handling	0.607	0.443	0.627	0.47
Document Accuracy	0.795	0.569	0.758	0.623

APPENDIX G

TABLE G-1 THE TOP 10 PRODUCTS EXPORT BY GHANA

1	Gold	\$7,203,866,760.39	44%
2	Crude Petroleum	\$3,003,396,221.30	18%
3	Cocoa Beans	\$2,391,276,433.83	15%
4	Cocoa Paste	\$386,569,593.50	2.3%
5	Manganese Ore	\$215,178,801.83	1.3%
6	Refined Petroleum	\$214,827,802.36	1.3%
7	Petroleum Gas	\$198,039,288.01	1.2%
8	Processed Fish	\$150,894,899.57	0.92%
9	Coconuts, Brazil Nuts & Cashews	\$144,367,646.14	0.88%
10	Coffee	\$133,515,676.99	0.81%

TABLE G-2 THE TOP 10 EXPORT DESTINATIONS OF GHANA

1	South Africa	\$4,446,174,246.55	27%
2	United Arab Emirates	\$1,637,539,714.00	9.9%
3	Switzerland	\$1,297,793,222.67	7.9%
4	France	\$1,204,194,415.82	7.3%
5	Italy	\$1,098,914,763.21	6.7%
6	Netherlands	\$814,572,920.15	4.9%
7	China	\$628,425,384.46	3.8%
8	Germany	\$468,788,272.52	2.8%
9	United Kingdom	\$415,013,517.61	2.5%
10	Togo	\$409,278,553.88	2.2%

TABLE G-3 SHIPPING COMPANIES OPERATING IN GHANA AND REGISTERED UNDER THE GHANA SHIPOWNERS ASSOCIATION

1	ANTRAK GHANA LIMITED	10	MARITIME AGENCES (WA) LTD
2	BOLLORE (GH) LTD	11	MSC MEDITERRANEAN SHIPPING COMPANY GHANA
3	DELMAS/ CMA-CGM	12	MOL GHANA LIMITED
4	GMT/ACS (GHANA) LTD	13	OMA GH. LTD
5	GRIMALDI GHANA LIMITED	14	PIL GHANA LTD
6	HULL BLYTH GHANA LIMITED	15	SAFMARINE
7	INCHCAPE SHIPPING SERVICES	16	SHARAF SHIPPING AGENCY LTD
8	INTERMODAL GHANA (ISAG)	17	SUPERMARITIME GHANA LIMITED
9	MAERSK GHANA LIMITED	18	mitsui GHANA LIMITED

TABLE G-4 GHANA'S GDP INDICATORS 2015 (PERCENTAGE SHARE IN USD)

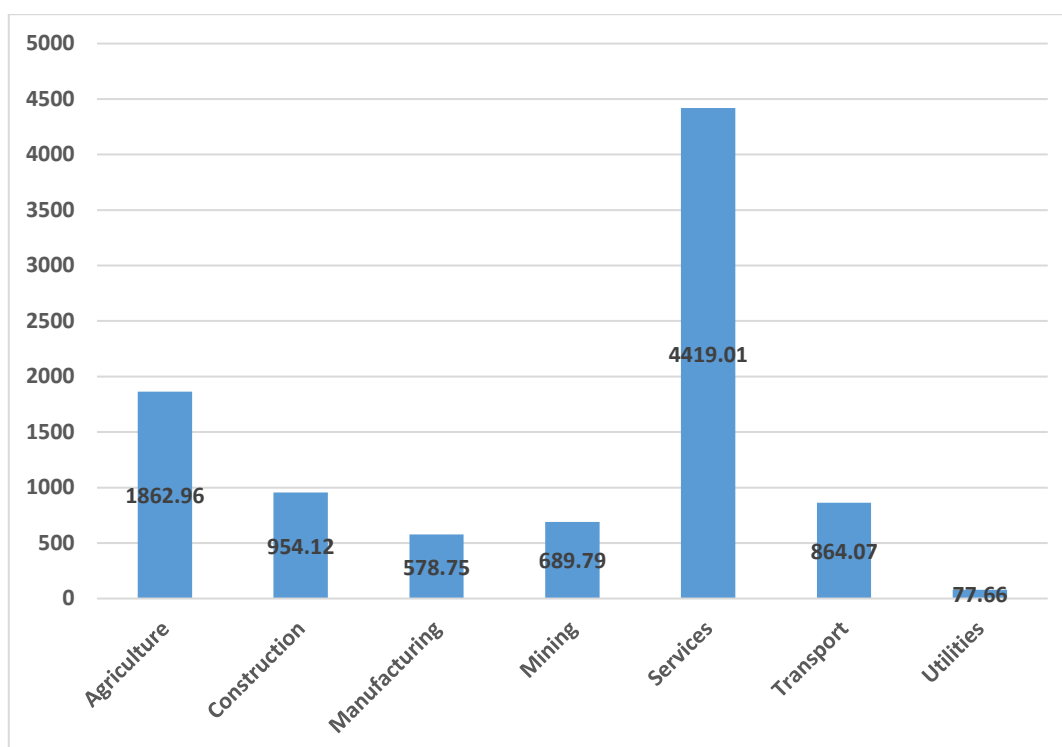


FIGURE G-1 GHANA'S EXPORTS OF GOODS AND SERVICES (% OF GDP GROWTH)

